The New England
Journal of Medicine

Copyright, 1942, by the Massachusetts Medical Society

VOLUME 227 JULY 2, 1942 NUMBER 1

THE RELATION OF MEDICINE TO THE EMERGENCY*

FRANK H. LAHEY, M.D.†

BOSTON

CERTAINLY, after what we have been through in this country and what we have seen other countries go through, no one can fail to say that we have been slow to convince, slow to profit by such tragic examples in other countries, slow to suspect and slow to prepare, and that we have likewise been woefully slow in accelerating our war effort. No one can truly say that many of our leaders have not been aware of the fogginess concerning this situation, or that these leaders have not warned us of our dangers. As a moral example to ourselves as we face our truly dangerous future, we must admit that we have stupidly believed what we wanted to believe, in the face of the fact that to anyone with simple, unbiased sense it was evident that the true situation was what we did not like it to be. Experience is often bitter medicine to take, but even though we seem stupid to ourselves as we review the past year, we should have much to be thankful for if we were even now to learn the lesson that the situation the country finds itself in is not what we should like it to be, and that to make it so will require our every resource in energy, unity, courage, speed and tenacity.

One of the things that has impressed me as I have traveled the country urging on the medical profession the need for physicians is that the country is so sensitized to rumors. If we could only realize that rumors, innuendoes and gossip are such bad things! Whoever heard of a good rumor? A rumor is always bad. If we could but realize that rumors, innuendoes and gossip tend to lend aid to our enemies by promoting confusion, discord and strife, we should, I am sure, avoid the spread of such rumors. I have endeavored to develop for myself a philosophy for this emergency, and it is that in place of rumors I shall employ, when I am so inclined, frank criticism. It has at least the virtue of honesty of purpose, and of willingness to accept the penalties that go with responsibility if I am wrong. Criticisms of our neighbors and their war efforts — and in times such as these they become prevalent — are often an apology for our own shortcomings or an attempt to publicize and make prominent whatever we have done by attracting attention to it by comparison with others. Conscientious labor and true patriotism are practiced for the convictions that go with them. Their consistent performance brings to the possessors of these convictions all the reward they require. Publicizing of the virtue of patriotism questions not only the pureness of its quality but also, as publicized charity does, the sincerity of its purpose.

Every doctor, I am certain, is particularly interested in what the immediate needs for the services are, and since I am in regular contact with the offices of the Surgeons General in Washington through the Procurement and Assignment Service, it is possible for me to state quite accurately what these needs are. To meet the requirements of its rapidly mounting numbers, the Army must have twelve thousand additional doctors by January 1. To meet the immediate needs of aviation and the Army, it must have seven thousand doctors by July 1. These are not probable needs; they are real needs if we are to maintain the table levels that are now accepted for the Army — 6.5 physicians per 1000 men, 1.5 dentists, and 0.75 veterinarians.

The immediate need for doctors to go with troops is in the age group up to thirty-seven, and for specialists in that up to forty-five. Why is it necessary for the Army to have age groups such as these? The reason should be obvious to everyone: this is a war of many and distant fronts. We are all conscious of the fact that cargo space is at a premium, and to ship a doctor of greater age than this is to accept the possibility of his breakdown in a distant place; such an event would require not only more cargo space to get someone there to take his place but also the services of those who have already been transported there to take care of

*An address delivered at the annual banquet of the Massachusetts Medical Society, Boston, May 26, 1942.

†President, American Medical Association.

him and feed him. This is a bald and plain statement why age groups such as these are desirable.

Older men have frequently asked me whether there would be an opportunity for them in this war. There will undoubtedly be an opportunity for everyone if the war goes on long enough, as it very well may. The demand for doctors will be so great that everyone from all the various age groups will be required either in industry and hospitals, to care for the civilian population, or in other branches of the national endeavor. We must all realize in civilian life that there will be not only adjustments, such as those to sugar and to tires and gasoline rationing, but also, as the situation becomes more acute and the endeavor more prolonged, changes and modifications in medical care; the civilian population must adjust its mind as satisfactorily to these rationings as to the more tangible and obvious ones, such as things to eat, to wear or to ride in.

Finally, I should like to urge the profession in general, particularly physicians under forty-five, who fall under selective-service regulations, to volunteer at once and not wait further. The need for medical personnel, particularly for aviation and the Army, is so urgent that if they are not already listed by their state chairman of the Procurement and Assignment Service as essential for a medical school, hospital, civilian population or industry, they should by all means immediately seek a commission. Every doctor of forty-five or under must realize that he is actually in the hands of the Selective Service System and that he is being deferred in Class 2-*A* only up to the time when it is determined that he is either essential — this decision being made by the state committee of the Procurement and Assignment Service — or not essential. Whenever he has been listed as not essential, he becomes literally and actually subject to induction.

It is with no purpose of threat that I make these statements. The Army must have medical personnel. It has deferred by presidential request to the Procurement and Assignment Service until such time as essentialness has been settled, and should it not obtain the necessary number of doctors by voluntary enlistment, there is no way to obtain them except by requesting selective-service boards to change the status of these men from deferred classification in Class 2-*A* to draftability in Class 1-*A*. It is to be hoped that compulsion in this emergency will not be necessary.

605 Commonwealth Avenue

THE PROCUREMENT AND ASSIGNMENT SERVICE FOR PHYSICIANS IN MASSACHUSETTS*

REGINALD FITZ, M.D.†

BOSTON

THE Procurement and Assignment Service for Physicians, Dentists and Veterinarians, established recently in the office of Defense, Health and Welfare Services, is an interesting experiment in medical democracy. So far as doctors are concerned, it is designed to give every qualified physician an opportunity to enroll himself in one of the several services demanded by the national need. An enrollment form and a questionnaire have been circulated recently, which all physicians should fill out carefully and at once. Only with the information that will be obtained from these forms can the Procurement and Assignment Service perform its functions intelligently and expeditiously.

The Procurement and Assignment Service for Physicians began to function in Massachusetts on January 30, 1942. The method by which this service might operate most effectively has necessitated the establishment of a central corps-area committee for New England under the chairmanship of Dr. Walter G. Phippen; under him are appropriate state and district subcommittees whose duties are to obtain as many doctors as possible for military use and at the same time to see to it that the civilian needs of medical care in each community are unhampered. This report of the first three months' experience is now presented by the Massachusetts committee.

The Army, Navy and Public Health Service wish to attract officers as volunteers, not by induction; thus, each person who applies for a commission through the Procurement and Assignment Service does so voluntarily. To be eligible for a commission in any of the national services, a man must be a citizen of the United States and a graduate from a medical school acceptable to the medical departments of the United States Army or Navy or to other federal agencies. He must have

*Presented at the annual meeting of the Massachusetts Medical Society, May 27, 1942, and as a report to the Council of the Massachusetts Medical Society from the Massachusetts Committee of Procurement and Assignment Service. The members of this committee are: H. M. Clute, J. J. Curley, E. L. Kickham, Dwight O'Hara, W. H. Pulsifer and Reginald Fitz, chairman.

†State director for Massachusetts, Procurement and Assignment Service for Physicians.

had a twelve-month internship or its equivalent. He must be a licensed practitioner of medicine.

Experience has demonstrated that young physicians make more effective medical officers than older men. The present Army and Navy needs are for physicians under thirty-six years of age. Those under thirty-six desiring immediate commissions may now write to the Procurement and Assignment Service, 601 Pennsylvania Avenue, N. W., Washington, D. C., or may interview Lieutenant Colonel Alexander Marble at 319 Longwood Avenue, Boston. Those who are qualified will receive proper application forms for commissions in the Army or the Navy. The filling out of the enrollment form does not constitute an application for a commission: the man who wishes to volunteer must, in fact, apply to the proper authorities.

One of the first problems presented to the Massachusetts committee has been to analyze the physician complement of Massachusetts in younger men, to determine those who might best be spared for national service by their civilian communities.

In the State, at present, in round numbers, there are 8000 doctors. Of these, approximately 3300 are less than forty-two years old. Women and foreigners are not eligible for commissions. There are a certain number of young men, too, with physical handicaps so serious that even most liberal standards cannot pass them. Their bearers are hopelessly unfitted to withstand the vicissitudes of Army or Navy life. The exact number of women doctors, foreigners and physically unfit men has not been counted accurately, but it is a fair assumption that about 10 per cent of all young doctors will be disqualified from any form of military service for one or the other of these reasons.

Of the 2970 remaining, a certain number will be absorbed in the necessary work of medical teaching. Obviously, if the practice of medicine is to continue, an uninterrupted procession of students must march through the medical schools, and their pathway of effective medical education must be interfered with as little as possible.

Boston University, Harvard University and Tufts College were asked to submit to the Massachusetts committee a list of their medical faculties, marking each member as an "essential" or "available" teacher. When the first lists were completed, the three deans conferred with the state chairman and agreed to revise their lists for the purpose of retaining as "essential" teachers only those under forty-two who in fact were necessary to a smoothly continuing process of medical education. These three faculties employ, ordinarily, 707 such young teachers. Of this large list, only 148 have been retained as "essential." These essential young men are, in the main, engaged in teaching the preclinical sciences or in working on research essential to national defense. The medical schools have adopted the policy that good clinical teaching can be conducted very largely by older men. Each school has determined to be understaffed rather than overstaffed with young clinical teachers, and thereby has set a good example for unselfish, patriotic conduct to the rest of the country.

Before the Procurement and Assignment Service had become activated, a certain number of men had already volunteered and had been commissioned; others were in the Medical Reserve Corps or National Guard and were called to active duty. The exact number of such medical officers in Massachusetts has not been ascertained, but from known figures it is estimated that at present at least 300 young physicians already are with the armed forces or are commissioned to go on active duty when called.

The various hospitals that train interns and resident physicians or surgeons have presented an interesting problem. Those approved by the American Medical Association for this purpose were written to and were asked to estimate the minimum number of interns and residents with which they could operate effectively each year. There are two types of hospitals in this group: the state institutions and those privately endowed. The state institutions will require a resident staff of about 100 young physicians and, without much question, will obtain them. The privately endowed institutions, on the other hand, claim to need a staff of 490 interns each year and 180 resident and assistant resident physicians or surgeons.

These figures are of considerable interest. The supply of interns is maintained in large measure by recent graduates of medical schools. The accelerated program of medical education adopted by most of the schools in which classes graduate at nine-month intervals instead of annually will do something to maintain the supply. On the other hand, even under the accelerated program, there are not enough students in the Massachusetts schools to yield more than 350 interns a year. Normally, the necessary extras have come from other than local medical schools or from persons who have accepted repeated internship appointments.

After July 1, nearly all medical students will be commissioned officers in the Army or Navy on graduation, likely to be called to active duty on completion of a year's internship. The chance for a man to experience more than a year's internship will be slight. The entire country offers more internships than can be filled so that the supply of men outside Massachusetts coming to our hospitals will be curtailed. And finally, because of the need for medical officers and the large number

of internships available, it is a reasonable assumption that the Surgeons General will permit students but little free time after graduation in which to begin their hospital appointments. All this means that Massachusetts hospitals face a shortage of interns. Hospitals will be fortunate if they can fill, successfully, two thirds of the appointments that they offer. It appears desirable to suggest to the hospitals approved for intern training that they offer twelve-month appointments, to begin as promptly after the end of each medical school academic year as possible, and to warn them of the possibility of being unable to fill all the appointments offered.

The resident situation is even more precarious. An appreciable number of resident physicians and surgeons have already left hospital posts. The armed forces have argued that any healthy doctor with hospital experience of a year's duration is suitable for military service. Many residents, imbued with a high spirit of patriotism, resigned their posts as quickly as possible after Pearl Harbor.

So long as the present emergency lasts, it is reasonable to assume that it will be hard for hospitals to acquire and hold resident physicians and surgeons. They must be drawn largely from those men who are disqualified physically from more active work or from women. The Massachusetts committee, acting on advice from the Surgeons General, is no longer disposed to regard all residents as "essential" men. A few residents occupying responsible posts in large teaching hospitals may be retained.

There are approximately 200 hospitals in Massachusetts. As has been stated, one of the purposes of the Procurement and Assignment Service is to see to it that the civilian needs for medical care in each community are unhampered. Each hospital has been invited to submit to the committee a list of its staff, each member thereon being classified as "available" or "essential." Up to the present time, returns have been received from nearly two thirds of the hospitals in the State. The figures so assembled from the samples given offer suggestive data.

Of 1187 doctors under forty-two years of age who are above the rank of residents on hospital staffs, 512 (43 per cent) are regarded as "essential" to hospital work; 525 (44 per cent) are "available"; and 150 (13 per cent) are already commissioned or have applied for commissions in the Army or Navy.

These figures enable one to visualize, with reasonable accuracy, the present situation in Massachusetts regarding the procurement and assignment of physicians, which is graphically illustrated in Figure 1. If these figures are even as approximately correct as they are believed to be, a continuous supply of about 1200 young doctors is necessary to the health and welfare of the citizens of Massachusetts, and there is a pool of about 1800 in which must be determined the ones who can be properly claimed as "essential" in their civilian capacities, and those to be regarded as "available" for military service.

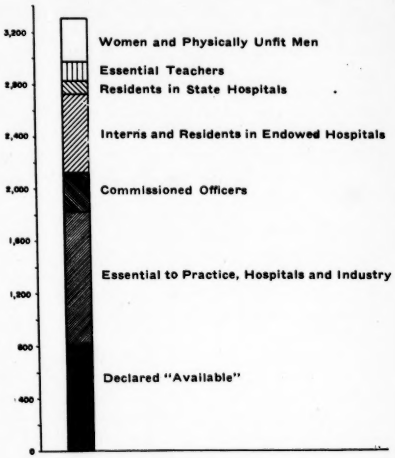


FIGURE 1. *Classification of Physicians in Massachusetts Less than Forty-Two Years of Age.*

It is to be emphasized that the medical corps of our armed services are comprised of volunteers and not of inducted men.

Up to the present, the names of those who have volunteered since the Procurement and Assignment Service was established have been forwarded from the central office in Washington or from the corps-area chairman to the state chairman, and he, in turn, has forwarded them to the appropriate district committees. The district committees have studied the case of each name submitted to them and have cleared the owner as "available" or "essential." Finally, the state chairman has made certain, before rendering to Washington his final report, that the person under consideration was not an "essential" teacher or hospital-staff member.

This general policy appears sound and seems to give appropriate consideration to each case. To date, 394 names have been cleared in this manner. Of these, 308 (78 per cent) have been deemed "available" for national service.

This plan of managing the medical profession during the present war is still in the experimental stage. Four hundred "clearances," however, seem a reasonable sample from which to take a preliminary account of stock. For this purpose, a population map of Massachusetts* has been constructed in which each county has been arranged in size according to its population (Fig. 2). In each county, the total number of doctors has been listed, each dot on the map representing 10 doctors; and finally, in each county the number so far declared "available" by the Procurement and Assignment Service has been set down.

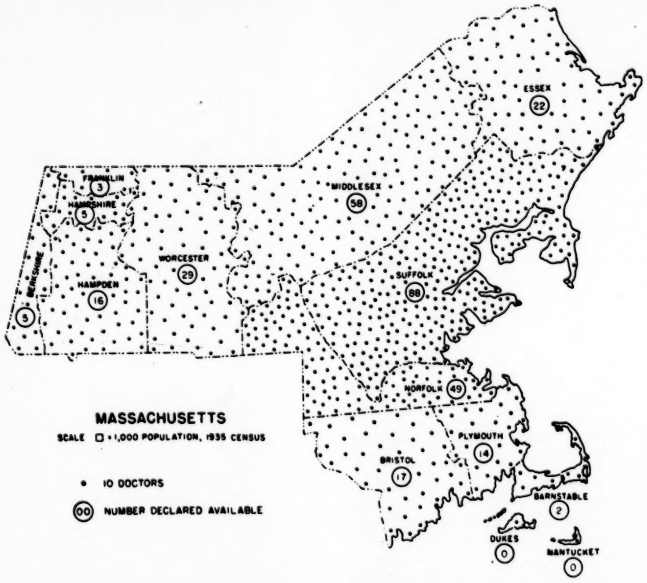


FIGURE 2. *Population Map of Massachusetts Showing the Distribution of All Physicians and That of Those Declared "Available" by the Procurement and Assignment Service.*

As can be seen, the distribution of doctors throughout the State is relatively uniform, except that Norfolk and Suffolk counties appear somewhat overcrowded medically. Certainly, the total supply of doctors seems ample for some time to come.

That the local committees have worked honestly in analyzing the list of names sent to them is suggested by a tabulation of the medical population of each county and by the number of doctors therein declared "available" (Fig. 3). There appears to be remarkable uniformity in the manner in which local committees operate. So far, no single county has been depleted of its young medical men, and the desire to supply medical officers has not outweighed the need to maintain proper oversight of civilian health.

One interesting impression has developed from this short experience with the Procurement and Assignment Service. The men whose names have been cleared have come from five sources. They have come from Boston University, Harvard University, Tufts College, approved medical schools from outside Massachusetts, and finally, from schools at present not recognized by the Surgeons General, the most important Massachusetts medical school in this category being Middlesex University. Information has been obtained concerning the number of graduates, from these Massachusetts schools, under forty-two years of age and licensed to practice in Massachusetts. These figures have been compared with the number of men from these schools so far cleared by the Massachusetts committee of the Procurement and Assignment Service. The information obtained in this manner

*This map was constructed by Dr. W. L. Aycock, of the Harvard Medical School. The figures for physicians were taken from the 1940 edition of the *American Medical Directory*.

and illustrated in Figure 4 is of some interest.

The data suggest very pointedly that young physicians from all medical schools are, at present, willing but are in no great haste to offer their services to the country. On the other hand, there

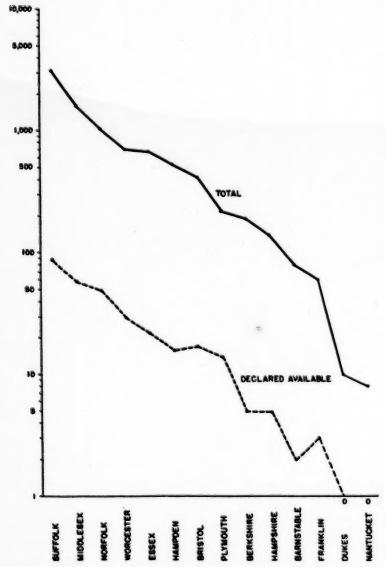


FIGURE 3. *The Relation of "Available" and Total Physicians in the Different Counties of Massachusetts.*

is no desire among any single group to behave selfishly in times like these. The figures offer additional support to the belief that there are large numbers of young physicians in Massachusetts still potentially available for military service.

To certain persons, one annoying aspect of the method of procedure up to date has been the delay between the date of volunteering, of "clearance" by the Procurement and Assignment Service, and of receipt of commission. To offset this, in Massachusetts, a team under the leadership of Lieutenant Colonel Alexander Marble has been established by the Army with power to commission, immediately, men cleared as "available" by the Procurement and Assignment Service. This means that henceforth the commissioning of our medical officers will be greatly accelerated and that annoying delays will be eliminated.

This, in brief, has been the experience of the Procurement and Assignment Service for Physicians in Massachusetts during the first three months of its existence. On the whole, the method adopted for enrolling medical men in national service seems workable, fair and considerate. The results are already promising and point to the fundamental value of a democratic way of building up a large volunteer medical corps.

When one looks to the future, it is obvious that there are many young doctors in Massachusetts who should enter military service as quickly as possible. Young physicians, especially those in Suffolk and Norfolk counties, where the medical population is so dense, should be enrolled in large numbers. On the other hand, all local committees must continue to see that no region or town in the State is depleted of its young men in the desire to supply medical officers. Civilian needs must not be forgotten.

Most of these young men already declared "available" by their hospitals may well be expected to take up the cudgels of war at once. "Essential" young men will soon be declared "available" to

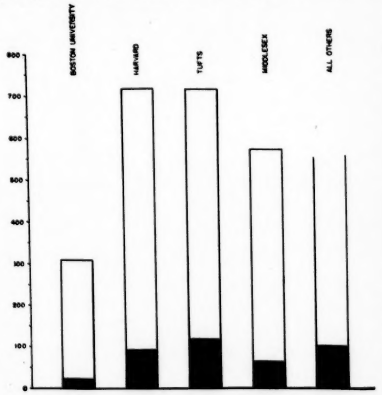


FIGURE 4. *The Source of Young Physicians in Massachusetts.*

The columns represent the numbers of graduates from 1926 to 1941 who are practicing in Massachusetts, the solid portions showing the numbers of those already investigated by the Procurement and Assignment Service. The total number of graduates from medical schools outside Massachusetts is not known.

volunteer, if need be, and as hospitals become adjusted to the view that older men on their staffs are still capable of doing more than a full day's work. The health of the Commonwealth need not suffer from this plan, for there are more than enough doctors to go round. All physicians of Massachusetts will contribute more than their share in doing the work that must be done.

319 Longwood Avenue

CIVILIAN MEDICAL DEFENSE IN MASSACHUSETTS*

ELLIOTT C. CUTLER, M.D.†

BOSTON

THE Committee on Public Safety welcomes this opportunity to thank the physicians of Massachusetts for their fine co-operation and their loyal and generous assistance in organizing for the care of the civilian population injured by enemy action. Up to the time of Pearl Harbor, there were two almost equally divided opinions concerning the necessity for this effort. In fact, the group who thought such efforts were silly and wasteful were the more vociferous. The injuries sustained by civilians in Hawaii and Tokyo had a salutary effect in behalf of those who, although they may not expect bombing, believe that the best defense against it is suitable preparation. One should remember that it has repeatedly been stated in England that gas was not used there because England was better prepared for this dilemma than Germany. Preparation is the best defense.

We here do not need to have an elaborate organization or spend the public funds in setting aside great numbers of empty beds. Sir Wilson Jameson,‡ chief medical officer of the British Ministry of Health, said last winter while he was here, "The tremendous anticipated casualties never did materialize, and it was found that to try to run a service of this kind on a full-time basis was not satisfactory." What we need is a simple and mobile organization of our entire facilities. Moreover, in considering any organization, we must conserve trained professional personnel and use, preferably, persons over forty-five years of age or those with physical disabilities that prevent active service with the armed forces.

Civilian medical defense in Massachusetts began with the establishment of the Committee on Public Safety in September, 1940. It was the hope of the Medical Division that a system could be set up that was *mobile* so that assistance could be obtained from many communities and sent to a distant community if the need proved great enough. It was further hoped that expenditure of public funds could be kept down by avoidance of the permanent dispensary construction that was undertaken in London, and that a minimum of professional personnel could be utilized.

The State Central Committee is composed of the Medical Executive Committee and various subcommittees, all of which comprise representatives covering the Massachusetts Department of Public Health, the hospitals, the dentists, the nursing organizations, the American Red Cross, the medical examiners of the Commonwealth and the pharmacists. Indeed, all interests that might give aid should disaster occur have their share in this setup. Specialists in gas decontamination and persons who aid in the proper relation of the Medical Division to the Protection Division and Evacuation Division sit on this central board.

The function of the Central Committee was to set up a system that could be utilized throughout the Commonwealth in small rural areas as well as in the large urban centers and to assist the local communities in obtaining the necessary equipment for the task. To assist the committee, there are, in each of the nine regions into which the State has been divided, regional medical heads, who have a group of deputies to help them. These deputies represent more intimately the members of the district societies of the Massachusetts Medical Society, the dentists and the hospital superintendents. They assist directly in stimulating the 351 communities to complete their organizations and give them practice. They help in the distribution of supplies and in the proper blacking-out and organization of hospitals. In each of the district warning centers, which are the nerve centers of the information system, a deputy medical head must be at hand to give the controller expert information on medical matters. Information concerning the number of ambulances, first-aid posts and vacant hospital beds in that area must be available. Should these be used up, the deputy medical head must know where others can be obtained. In fact, these regional setups should be so complete that, if the state office at 18 Tremont Street, Boston, were wiped out, relief to the citizens would go on in a competent and satisfactory manner.

The plan now in use in the 351 communities of the Commonwealth puts full authority and responsibility for the setting up of medical assistance on the shoulders of the local chief medical officer. The plan is as follows: in each community, there are four parts to the medical services — first-aid parties, mobile medical first-aid posts, transportation facilities and hospitals (Fig. 1).

*Presented at the annual meeting of the Massachusetts Medical Society, Boston, May 26, 1942.

†Moseley Professor of Surgery, Harvard Medical School; surgeon-in-chief, Peter Bent Brigham Hospital; director, Medical Division, Massachusetts Committee on Public Safety.

‡Jameson, Sir Wilson. *Hospitals in England Today*. 14 pp. New York: Hospital Council of Greater New York, 1941.

A first-aid party consists of six lay people trained in first aid who carry on their persons suitable first-aid equipment. They are sent out to the scene of an incident, where they apply temporary dressings and first aid, guide the walking wounded and carry the stretcher cases to the physicians and nurses in the medical first-aid posts.

A mobile medical first-aid post is a group of physicians, nurses and lay people trained in first aid who set up in a building an incident dressing station. There are two doctors and two nurses so that one professional group can take charge of the stretcher cases, and the other group the walking wounded. No attempt should be made to carry out surgery at this point other than the ligation of a bleeding vessel or the control of some dire catastrophe. At such posts, hot drinks should be served by mobile canteens, suitable dressings should be added to the dressings already applied, splints should be readjusted or applied, and morphine should be administered for comfort. The stay in a first-aid post should be minimum, since the critical point in the recovery of injured people is proper surgical care in a hospital.

Transportation facilities. After preliminary dressings and the splinting of fractures have been carried out in the first-aid post, the injured people are taken by some kind of vehicle (and anything that moves on wheels from a sand truck to a beach wagon or a sedan will do) to the nearest emergency hospital.

Hospitals. At the hospital, provisions must be made for one-way traffic. The walking wounded and stretcher cases should be separated and looked after by separate teams. The hospitals must be properly blacked out — at least the admitting rooms, the x-ray departments and the operating rooms. They should be prepared, from now on, to send home convalescent people and noncritically ill medical patients, to make room for casualties, and the hospital staffs must be organized into eight-hour or twelve-hour shifts so that the professional care may go on continuously. We have listed 95 hospitals that have more than 50 beds and are not special hospitals as places suitable for such work, but in a grave emergency, any hospital must be ready to function for this purpose.

In the event of continued bombing, casualty cases and others will be evacuated from metropolitan areas to rural hospitals in the country that have been called "*base hospitals.*" At present, some 6000 beds are available in rural state institutions for this purpose. The staffs of these base hospitals will need to be supplemented, and the Medical Division has been given the privilege of nominating certain physicians, preferably over the age of forty-five, for reserve commissions in the United States Public Health Service. It is expected that such reserve officers, when called to active duty, will be ready to leave their homes and practice, put on uniforms and go to service as directed.

The medical equipment and the stretchers, blankets and splints for the desired number of first-aid parties and medical first-aid posts are now being distributed on the basis of two parties and one post per 10,000 inhabitants. Massachusetts, at this ratio of distribution, will require 438 posts. However, since small communities cannot be divided at that ratio, we shall probably end up with about 1000 first-aid posts. The gauze equipment for all these posts has already been provided by the Boston Metropolitan Chapter of the American Red Cross, sterilized at the Peter Bent Brigham Hospital, and delivered to the communities. The pharmaceutical supplies, including morphine, alcohol and other drugs, have been donated by the Massachusetts Pharmaceutical Association and have been distributed to the communities.

Lest anyone should think getting material ready for civilian defense is a little job, imagine the task of dividing 140 pounds of sulfanilamide into 23,000 3-gram lots! In addition to our own labors, we have assembled 65,000 air-raid warden's belts, with their equipment, for the Protection Division. The belt material for the first-aid parties was given by the New England Rainwear Manufacturing Company, and the material was stitched into belts by the Ladies Garment Workers Union, who gave 18,000 hours of free labor. We hope, eventually, to acquire additional medical supplies, splints, stretchers, blankets and so forth from the federal government in Washington, but thus far, all supplies and equipment and training have been arranged locally by the Medical Division of the Committee on Public Safety. (It may seem peculiar to some of you that the federal government has not taken a greater interest in the protection and care of injured citizens, since war is obviously a general governmental undertaking, but all of us must recognize the serious demands on the Government at this time. Criticism will not help, and until each citizen is devoting a part of his time daily to the national welfare, he can scarcely criticize others. Remember that this civilian defense is a voluntary effort and, therefore, perhaps somewhat protected from the chronic "grouser.") Many generous citizens have given time and funds, and an attempt has been made to keep the expenditure of tax funds as low as possible. An especially welcome gift was the receipt of twelve complete field sets (consisting of two boxes of bandages, splints, instruments and drugs) suitable for equipping a medical first-aid post from the Medical and Surgical Relief Committee of America, which has its headquarters in New York City. These sets have been distributed either to vulnerable areas, to areas that deserve assistance because of their generous labors, a reward for virtue or to areas where the expense of equipping such necessary units was beyond local means. Furthermore, through the efforts of the Massachusetts Pharmaceutical Association, 978 emergency medical depots have been established throughout the state.

The functioning of first-aid parties and posts is similar for all communities (Fig. 1). Information of damage will reach the chief air-raid warden of every report center in that area. The chief medical officer will then send to the incident the proper number of first-aid parties and posts in vehicles, later to be used to transport the wounded. From the first-aid posts, the injured will go to

the nearest hospital, whence, after an interchange of blankets and splints, the ambulances will return to the first-aid posts.

The Medical Division has further responsibilities such as the care of persons who are gassed. In this responsibility are two groups. The first includes those simply gassed but uninjured. Such people will be taken to a gas decontamination center, where they will be denuded of their clothing, thoroughly washed for decontamination, and finally given fresh clothing supplied by the Commonwealth. The intricacy of such a setup, with its gas locks, decontamination and ventilation, need not be gone into here. The Commonwealth has set up an ideal center of this type in the basement of the former Huntington Hospital. This phase of our activities has been under the direction of two physicians, who have not only been willing to go away to acquire an education in this field but also have, in turn, given several courses to doctors of the Commonwealth, so that all communities may be thoroughly instructed in this vital matter. Such decontamination centers should be set up at the rate of one per 100,000 inhabitants. A different handling of patients must be followed when one considers the person who is both injured and gassed. This requires the organization, in the admitting section of each hospital, of a very simple gas decontamination annex, which must have at least two rooms separated by a gas lock. There must be one area in which to rid a gassed person of contaminated clothing and another area in which to decontaminate the victim by washing before he is admitted to the hospital for further surgical care.

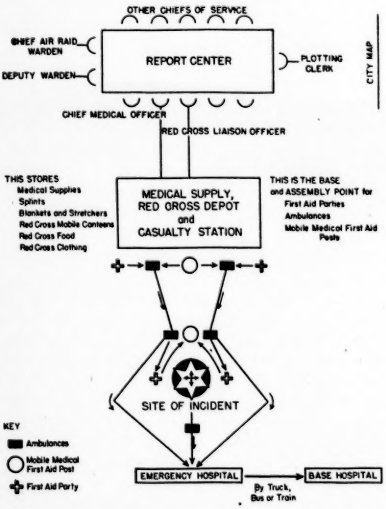


FIGURE 1. *Community Organization at and from the Report Center.*

A particularly happy phase of the work concerns our relations with the United States Public Health Service. Through their generosity, two members of the Medical Division will hold commissions in that federal branch. We are further authorized, as previously stated, to set up reserve affiliated units in the Public Health Service. In addition, we can utilize certain of our colleagues as consultants in the United States Public Health Service should the magnitude of the occasion necessitate such service. Another activity has been the gift to the Commonwealth of large funds to be invested in the establishment of blood banks. These will serve not only for the military period but also as a permanent contribution to better medical care in this state. Finally, through this same source, the cost of the care of civilians injured by enemy action will be borne by the federal government, including those injured by sabotage, in blackouts and from direct enemy action by combat forces.

Another essential relation is that to the Evacuation Division. In the coastal areas, this division's activities may be of the greatest moment, either because of enemy action or because the military commanders order the evacuation of seacoast districts. The movement of large masses of the population has been planned for, and in the Evacuation Division there is a medical group, since the same diseases and disorders will go on whether there is war or peace. To conserve the already reduced medical personnel of the State so far as possible, we have frequently utilized physicians for work in both divisions. We have also made arrangements with the Evacuation Division that, should evacuees be so ill as to require hospitalization, they will be turned back to the Medical Division; thus, the establishment of two medical groups to deal with the hospital problem will be avoided.

We still need more first-aid party members and more people trained in first aid to serve in the first-aid posts and as ambulance drivers. The response of physicians and dentists to this effort has been entirely gratifying and satisfactory.

It would be invidious for me to mention any personal names before our colleagues. I have always told His Excellency, Governor Saltonstall, that he need have no fears about the medical aspect of civilian defense, that everywhere in the Commonwealth doctors were happy to help out. It is

now my privilege, however, to thank publicly, though anonymously, those of your colleagues who have shared together in this great effort. It has robbed many of your friends of sleep and income; it has kept them working late into the night when others were at theaters. But it has been a job done for the good of our people, and I congratulate the medical profession for complete and totally unselfish devotion to the common good. The time has now arrived when new efforts are required. The American people, who are naturally optimistic and already misled by unjustifiably hopeful news on the radio and in our newspapers, are beginning to think that we are winning the war and that the end is in sight. This is now leading to defection in the ranks of civilian defense. Air-raid wardens are less conscious of their tasks, and some are resigning. The cold facts are that we have not won a battle yet. In England, civilians were not bombed until the country had been at war eleven months. Now, as never before, we of the medical profession must stand as a power to keep this essential activity alive and ready for the emergency. We cannot say when disaster will come, any more than the residents of Pearl Harbor or Tokyo could, but we must not underestimate our enemy and we must be prepared lest the women and children of this commonwealth suffer through our carelessness. Every physician who is not serving his country in the military forces should devote a part of each day to this grave and vital responsibility.

THE PHYSICIAN'S ROLE IN FIRST AID*

A. William Reggio, M.D.†

BOSTON

IT is difficult to understand why it took Pearl Harbor to make the medical profession take an interest in first aid, and yet, on the other hand, it is not so difficult. If one faces the question squarely and honestly, one finds two outstanding reasons for this lack of interest on the part of at least 95 per cent of the medical profession: the great majority of medical schools, until recently, have completely omitted the subject of first aid from their courses of study; and physicians are consequently unfamiliar with — and, one might say, ignorant concerning — the subject matter and methods of first aid.

Gradually, physicians are discovering that first aid really amounts to something — that it is not merely childish nonsense or an attempt to turn laymen into doctors in a few short lessons. They are also finding out that the layman expects any physician to be able not only to render first aid in the best and most approved fashion but also to teach the subject to a class at a moment's notice.

Unfortunately, although physicians can diagnose the most obscure diseases and treat the most difficult conditions, when all hospital facilities are available, they are completely at a loss when faced with the problem of administering first aid or transporting a victim to a hospital without the usual equipment.

First aid is not, and must not be considered, a matter too elementary for the serious consideration and assimilation of every physician.

The training of laymen in first aid was begun by the American Red Cross in 1910, when the first class was taught and the first certificates issued, denoting the successful completion of this first course. It took twenty-five years to reach the first million certificates — from 1910 to 1935. Then, for the second million, it took four years, that is, from 1935 to 1939, and the third million from 1939 to 1941, or two years more. During the past year, the fourth million was completed.

In a personal communication, I have just been informed that during the month of March, 1942, Washington issued about 352,000 standard certificates and was still behind in issuing the total number requested. At this rate, if it keeps up, — and it seems to be doing so, — there will be over 4,000,000 standard certificates issued for this year alone. To emphasize this once more: thirty-one years, 1910 to 1941, 4,000,000 certificates; in all probability in this one year, 4,000,000 certificates.

Accordingly, the increased interest shown by the medical profession in first aid, as taught by the American Red Cross, is most encouraging. In January of this year, a short eight-hour course was given to a group of one hundred and twenty-five physicians from the different district societies so that they could transmit this knowledge to others and teach laymen in standard first aid. It was quite evident that all these doctors were pleasantly surprised at what they learned of a subject new to them and that they definitely enjoyed the sessions and profited by them. Since then, the number of doctors asking for instruction in the mechanics of first aid has been most gratifying and encouraging.

*Presented at the annual meeting of the Massachusetts Medical Society, Boston, May 26, 1942.

†Deputy medical director, Medical Division, Massachusetts Committee on Public Safety.

I shall not mention names, but ten or fifteen doctors in and around Boston have been giving many hours of their time to teaching not only laymen but also physicians and dentists so that they, in turn, could adequately instruct classes of laymen in the standard course. This has not been an easy undertaking, and they are to be congratulated for their perseverance and untiring efforts in doing this job and doing it well.

At long last, a standard course in first aid is being taught to practically all the students at Boston University, Harvard, Tufts and Middlesex medical schools. A large number of these young men have already received certificates as instructors in first aid, and many more are continuing toward that end. The students have taken up this subject with marked enthusiasm, and a number of them believe that the standard course in first aid should be a required part of the first-year curriculum. It is to be hoped that this desire on the part of the medical students will be heeded by the powers that be.

A grievance that it is in the province and power of the profession to dispel is the thoughtless and destructive criticism of first aid still being made by some physicians. Destructive criticism is vicious; constructive criticism is always welcome. It is less than it was a few months ago, but it is still going on and is doing harm by causing confusion in the minds of lay instructors concerning what they are teaching in their courses.

Two main topics are in dispute, namely, the use of iodine in wounds, and traction splinting in fractures.

The application of iodine *in* a wound is taught in the *First Aid Text Book* of the American Red Cross. Every effort is being made to have this teaching changed so that iodine — in mild, medium or full strength, it makes no difference — will not be used *in* any wound, and a revision of the text to that effect is advocated.

Traction splinting of fractures. Many physicians still do not appreciate the value of immobilizing fractures before the victims are moved from the scene of an accident to a hospital. The American Red Cross textbook teaches this, and every man familiar with and accustomed to treating fractures agrees with this recommendation. During World War I, the value of this method of transporting patients with fractures, particularly of the femur, from the field to the hospital was amply proved by the facts that before such splinting was instituted the mortality in this type of fracture was about 60 per cent and that after traction splinting was used the mortality dropped to about 25 per cent. This in itself indicates the benefit of this method, to any thinking person. Yet some doctors still oppose or fail to recognize the necessity of this precaution before moving victims with fractures. Although many laymen who have received certificates for having passed the examination in standard first aid are not capable or willing to apply this method in an emergency, at least they will be able to prevent others from doing the wrong thing to a victim, because they know what should not be done. For example, not very long ago, a victim with a broken lower leg was being prepared for splinting by a layman trained in first aid when a doctor arrived on the scene. The layman naturally gave way to the doctor, who, after some uncomplimentary remarks on the layman's efforts, proceeded to pick up the victim and place him in his car, making the fracture compound in the process. An occurrence of this kind is inexcusable, and should not be countenanced by the medical profession as a body How can one possibly expect the layman to respect the teaching of first aid when members of the profession so flagrantly disregard the most elementary principles in the care of the injured?

It is readily admitted that certain first-aid measures, as taught to laymen, seem inadequate in the eyes of some medical men, but one must not forget that the layman is not a physician and moreover, that he is not qualified, nor can he be expected, to use some measures that a medical man might be justified in using.

First aid is merely a way for the layman "to hold the fort" without further increasing the damage already done until the services of a doctor can be obtained. Passive inactivity on the part of such a first-aid worker is preferable to active inadequacy, and that is one of the principles taught in first aid. It is better, of course, to do nothing than to do the wrong thing. If the victim is merely left where he is and kept warm until help is available, many a life may be saved.

To play a part in first aid, the doctor must know something about it. Since many physicians are already affiliated with casualty units or mobile first-aid posts and will have working under their direction a personnel trained in first aid, they should be familiar enough with their duties to train these workers in practice sessions, so that in the event of an emergency the unit can function to the best possible advantage.

These people will ask questions that must be answered correctly in the layman's language. One cannot do this unless one can speak the same first-aid language as the personnel. The first-aid workers should not be told to do things that they have not been taught in their courses, and to avoid this confusion it behooves physicians to familiarize themselves with what the workers have been taught.

The commanding medical officer in charge of these mobile units must be able to train his per-

sonnel in stretcher drill. This it will be difficult for him to do unless he has first learned it himself. One hears complaints from many medical men in these units that they cannot obtain a sufficient number of people trained in first aid to act on their units and in the first-aid parties. The demand for instruction is heavy, and the number of lay instructors available is barely adequate to handle the number of applicants.

Hence, if the doctors themselves will instruct the people whom they will have working on their units, the number of trained workers will rapidly increase.

All this, of course, means *work* on the part of the doctors, but as this present emergency progresses, the amount of work will naturally increase; physicians must work even harder than they are doing already, and train their personnel. No one knows when some of the mobile first-aid units will be called on to function as the result of enemy action, and they will be expected to handle the situation adequately. The men in charge of these units and their organization are working day and night to be prepared and ready at a moment's notice. It is imperative that these mobile units hold practice sessions to become accustomed to working together under the tension and confusion that are bound to result if the emergency arises suddenly.

A tremendous responsibility is borne by the medical profession. The public looks to physicians to take care of them in the event of enemy action. Whence or how this will come is not known, but one certainty is that the emergency *will* arise and that physicians must be ready to cope with it and render the best possible care to the injured.

As more doctors leave civil practice to enter the Army or Navy, increased work is thrown onto those remaining behind. Mobile medical units already formed must find new men to replace the ones called to active duty. Such new men will have to be trained for this first-aid work, and it will help tremendously if all physicians look ahead even farther and acquaint themselves with what is going on in their communities and find out where they will be most needed and best fitted to serve.

Everyone should be familiar with the measures that are to be carried out at the medical first-aid posts or casualty stations throughout the State, and with the measures to be taken in the event of chemical or gas warfare as affecting the civilian population.

When the emergency actually arises, it will be too late to learn, and there has already been enough of "too little and too late." We cannot afford any more delays. We *must* anticipate the next play and be ready to checkmate it from the very start.

At the first-aid casualty stations, which will be set up as near the scene of an incident as possible, only the most essential first aid will be rendered to the casualties. Any major procedures will be carried out by the emergency teams at the hospitals to which victims are taken by ambulances from these medical posts. It is therefore necessary for the physicians comprising the personnel of these posts to be thoroughly familiar with such measures as the splinting of fractures for safe transportation.

They must be able to guide their first-aid helpers in the application of these splints, whether for immobilization or for traction. The control of hemorrhage is vital, and decisions concerning the application of a tourniquet must be made rapidly; correct application is essential and will be the responsibility of the physician in charge.

His familiarity with emergency procedures is vital, since he is the one who must keep calm and cool so that his assistants will not become panicky or disorganized in the face of conditions of suffering and injury that they will encounter, in actual fact instead of in theory, during their course of instruction. The physician is accustomed to sights and sounds that will be entirely new to the layman; it will be his responsibility to keep things running smoothly.

He must be familiar with artificial respiration, which is not so easy and simple as it sounds. Practice and experience in its administration are necessary before it can be done correctly and efficiently. Burns will have to be taken care of and quickly sized up as to severity, and appropriate first aid given with the materials at hand before the cases are sent to the hospital. Morphine must be given in sufficient dosage to quiet a victim during transportation. Judgment regarding the size of the dose is necessary to make sure that it is large enough to accomplish its purpose. Shock treatment of an elementary kind must be given to tide over the victim until he receives further treatment at the hospital. Major and minor wounds must be evaluated rapidly, and the danger of minimizing an injury must be avoided — especially in head injuries is this danger very great, as, of course, everyone knows. Underestimating the potential complications in head injuries may be fatal, whereas a more mature appreciation of possible underlying injury may make a tremendous difference. This is well known, but is worth emphasis.

* * *

To conclude, I again emphasize the importance of the physician's role in first aid — the layman looks to us for guidance and instruction. How can we possibly help him to the best advantage if we, ourselves, are not thoroughly familiar with this subject?

374 Marlborough Street

MEDICAL-SCHOOL PLANS FOR THE EMERGENCY*

BENNETT F. AVERY, M.D.†

BOSTON

AT a time when our very survival depends on an immediate all-out military effort, any civilian activity whatsoever must justify its right to continue. We have suddenly awakened to the startling fact that one plane or gun or ship now is worth ten next year and a hundred the year after. We are newly aroused to the necessity of throwing everything we have into ensuring that we do not lose the war this summer, and at the same time we are filled with the dawning hope that if we work hard enough and move fast enough we may achieve victory in 1942.

Nothing can have precedence over the priority that we must accord to the military effort, and it is in the light of this fact that we should examine the situation regarding medical education. We should consider not only the effect of the war on the medical schools but also the contribution the schools are making or can make toward winning the war.

It is now clear that, of the 155,000 practicing physicians in the country, 30,000 will soon be in the medical corps of the Army and Navy. It is conceivable that in a prolonged war this number might even be doubled. The effect, as you all know, is already being acutely felt in communities and hospitals. It will be far worse before it gets better. Every available young physician will soon be in active service, and if the war should take longer to win than we hope, there may not be enough who are physically fit to meet the needs of the military forces.

The inescapable conclusion is that it is the duty of the medical schools not only to continue in operation but to train capacity classes as rapidly as is consistent with the maintenance of high standards. This was early recognized by the three schools in Massachusetts, and on December 29, 1941, Tufts College Medical School, Harvard Medical School and Boston University School of Medicine issued a joint announcement to the effect that beginning July 1, 1942, summer vacations were to be eliminated in favor of a program of continuous operation.

To consider the many problems involved in the adoption of accelerated schedules, a special meeting of the Association of American Medical Colleges was held on February 14 of this year in connection with the Annual Congress on Medical Education and Licensure of the American Medical Association. The program was approved in principle for those schools that could adopt it without sacrificing teaching standards. Resolutions were passed at this time by the Council on Medical Education and Hospitals of the American Medical Association and by the Federation of State Medical Boards of the United States supporting the action taken.

The result has been that up to the present fifty-nine of the sixty-seven four-year medical schools in the United States have adopted an accelerated schedule, and four more are expecting to adopt one. In most cases, classes are to be admitted every nine months, beginning about July 1, 1942, and the four academic years will be completed in three calendar years. This means a 33 per cent speed-up in the production of physicians, showing its first fruits next February and March, when five thousand doctors will graduate three months earlier than normal. The following January, another five thousand will graduate six months early, and in September, 1944, a third five thousand will graduate nine months before the regular date. The climax will come at the end of three years, when a class of five thousand will finish a year ahead of the normal time.

The difficulties involved are great, but are no worse than those attending most phases of the war effort. Hospitals, faced with providing internships at nine-month intervals, have proposed making their old interns who have served nine months into junior residents for their remaining three months, to supervise the newcomers. The expected dearth of residents will make this feasible.

In seven states, the medical-practice acts require a recognized medical course to be given in four different calendar years, but amendatory legislation is under way or expected. In five other states, the law may be liberally construed as it stands. In the remainder, the question is for the examining board or other state approving agency to decide, and in view of the action taken by the Federation of State Medical Boards, no trouble is anticipated.

Almost universal action on the part of premedical colleges in adopting an accelerated schedule of their own will probably maintain a full supply of applicants for admission at the irregular nine-month intervals. My own observation has been that most applicants for places in the incoming class of next March expect to complete a full year's

*Presented at the annual meeting of the Massachusetts Medical Society, Boston, May 26, 1942.

†Dean and Waterhouse Professor of Anatomy, Boston University School of Medicine.

work between now and then, by taking a double summer session in addition to the regular fall semester.

The substitution of a short rest period between each academic year in place of the long summer vacation raised the question of financial aid to students who were formerly dependent on summer earnings. The generous action of the W. K. Kellogg Foundation in making available loan or scholarship funds to one hundred and fifty medical, dental, public-health and nursing schools in the United States and Canada has helped greatly in meeting this urgent need, and private donors have been generous. It may even be that a government loan fund will be established for succeeding years.

There is still the question how well the health of the students will stand the strain of continuous cycles of eight months of work followed by only one month of vacation, but plans are under way for an unusually careful watch over their physical condition. It is hoped that breakdowns due to tuberculosis or mental or nervous fatigue will not increase unduly.

The War Department, the Navy Department and the Selective Service System have recognized the need for maintaining a constant or increasing flow of graduates from the medical schools by deferring students in good standing almost without exception. All medical students and even those accepted as members of the next incoming class are now eligible for commissions as provisional ensigns in the Naval Reserve or as second lieutenants in the Medical Administrative Corps of the Army. In the latter event, not even a physical examination is required. All students commissioned are assigned to the study of medicine until they shall have completed their course and one year of internship.

So far as the faculties are concerned, the situation is difficult. Every school has lost large numbers of its younger staff members, but an effort has been made by the Procurement and Assignment Service to leave key men who are essential to teaching. Those remaining are carrying increased loads because of the smaller staff and accelerated schedule, with resultant sacrifice of research and vacation time. Even so, throughout the country, numerous members of the medical-school faculties are carrying on full-time or part-time research on special war problems, at the request of the National Research Council.

The teaching of military medicine has been given careful consideration, and proposals have been put forward by a special committee of the Association of American Medical Colleges, composed of Dr. Edwin P. Lehman, chairman, Dr. Currier McEwen and Dr. H. S. Mustard. It is suggested that, except in schools where a reserve-officers training corps is already established, there be no attempt to teach the organizational aspects of military medicine to undergraduates, unless it is for a brief course of orientation lectures.

It does seem desirable, however, that beginning in July, the first-year and second-year students who have not had first-aid training be given at least a twelve-hour course of lectures and practical work. Tropical medicine should be stressed in courses in parasitology and medicine, or even as a separate course in the clinical years. Discussions are now under way for the establishment of such a course as a co-operative effort of the three medical schools in Boston.

To quote the report of the committee:

> The necessity for stressing certain subjects of the professional aspects of military medicine within the framework of the present curriculum is recognized. These subjects include the following:
>
> Shock and blood substitutes
> Soft tissue wounds (including débridement)
> Fractures
> Burns
> Frost-bite
> Sanitation
> Control of communicable disease
> Prophylaxis and treatment of venereal disease
> Cardiovascular disease
> Fatigue states
> Anoxemia
> Compression and decompression
> Aeroembolism
> The physiology of high altitudes and dive-bombing
> Visual adjustments under war conditions
> Poison gases
> Industrial poisons
> Common psychiatric conditions, including modified peptic ulcer syndrome and effort syndrome
> Dermatoses and insect bites
>
> It is recommended that a special course on the professional aspect of military medicine be given to fourth-year students, to include any material listed which has not been previously given and any new material developing as the result of present war experience, such as the newer treatment of burns, the developments of sulfonamide therapy, immersion foot, blast injuries, renal failure of crush injuries, etc.

Even the faint possibility that we may suddenly need to evacuate certain of the medical schools that are located near the seacoast to safer districts inland has been considered. Tentative plans are being laid for removal to districts offering facilities not only for the schools but for the hospitals used in clinical teaching. Any possible arrangement would be far from ideal, but even though we confidently expect that no one will have to move, it seems best to be prepared, for once.

* * *

In conclusion, let me say that once again the medical profession has shown itself to be one of

the most patriotic and foresighted groups in the country. There seems to be no tendency for a brass-hat regime to obstruct swift and decisive action, and every medical school in the country is making every possible contribution to the war effort.

80 East Concord Street

HOSPITAL PREPAREDNESS*

CHARLES F. WILINSKY, M.D.†

BOSTON

THE country is at war. The long-accepted theory of safety and protection afforded by distance has been thoroughly shattered, and today the Atlantic and the Pacific oceans are no longer the protective barriers they were so long believed to be. It has been wisely concluded, therefore, that the whole country must be thoroughly organized for the defense of its population.

Much has been said and a great deal written about the place of the hospital in civilian defense. It requires neither particularly keen vision nor vivid imagination to appreciate in its fullest form the vital part that hospitals will be obliged to play in the drama of life and death that sabotage and war, if brought to these shores, will produce.

Modern warfare exacts a tragic toll, not only in a high percentage of deaths resulting from demolition and incendiary bombs, but also in serious injuries, whose treatment requires a high quality of surgical skill.

To meet these possible needs, the Medical Division of the Office of Civilian Defense was created in Washington and placed under the able direction of Dr. George Baehr. The necessity for the formation of state units was urged, and Massachusetts, in keeping with the richness of its traditions in the field of social consciousness and human welfare, was in the forefront of this essential development. We were particularly fortunate in the sacrificing willingness of Dr. Elliott C. Cutler to give so much devotion to the office of director of the Medical Division of the Massachusetts Committee on Public Safety.

Others who have spoken on this program have described the organization of the medical services, with their mobile units, which include physicians and other essential personnel. The establishment of first-aid posts near the scene of the incident, as well as medical depots and casualty stations, has been described. Fitting emphasis has been placed on the type of essential organization for the proper functioning of the groups mentioned above, and the services they are expected to render.

It is pertinent to call attention to a certain variance in the functioning plan for medical services in Massachusetts, as contrasted with the recommendations of the Medical Division of the Office of Civilian Defense in Washington. The plan of the latter includes the organization of medical field services from the nonsurgical resident staffs in hospitals, whenever possible. Among the important justifications claimed for this plan are the speed of mobilization and the economy of manpower. The plan in Massachusetts, for which Doctor Cutler is responsible, is built on the premise that hospitals should keep their staffs intact, to care for the injured brought to their doors. The medical field services are to be rendered by practitioners of medicine, recruited in the main from the areas in which they practice or reside and in which they are expected to serve at the time of the emergency.

In the planned organization of medical services, it is readily recognized that emergency hospitals must be made available for the care of the more seriously injured. Nearly one hundred hospitals in Massachusetts are intended to serve as emergency hospitals and are closely linked with their local civilian-defense organizations.

One could devote many pages to the specific recommendations that have been presented for the physical protection of hospitals, including buildings, personnel and patients. However, various factors intervene that must receive careful consideration in the development of local plans. It is, nevertheless, possible to agree on certain objectives, which may be considered the minimum goal of all hospitals.

Protection of Physical Property

The first objective is adequate protection of the physical property of the hospital against damage caused by sabotage, explosion, demolition and incendiary bombs, fires and so forth. This protection can best be accomplished by: the installation and maintenance of adequate blackout facilities; adequate protection against fire; organization for necessary emergency repairs to the hospital structure, including possible damage to heat, light, water, power, structural damage and so forth;

*Presented at the annual meeting of the Massachusetts Medical Society, Boston, May 26, 1942.

†Lecturer, Department of Biology and Public Health, Massachusetts Institute of Technology; executive director, Beth Israel Hospital; deputy health commissioner, City of Boston.

and the necessary protective mechanisms for safeguarding patients and personnel, including the organization of rescue squads, provision for air-raid shelters and so forth.

The maintenance of blackout facilities involves the expenditure of funds for blackout material and the cost of installations.

Protection against fires caused by sabotage or incendiary bombing compels the organization and drilling of fire squads recruited from employees as well as volunteers. A carefully selected fire warden trained particularly in the art of handling incendiary bombs will in turn impart this knowledge to spotters and fire fighters. The need of constant watchfulness is a major factor in protection against and control of fires.

The maintenance department of the hospital must concern itself with the problem of emergency lighting and particular protection of the telephone service, water supplies and the power and heating plants. The purchase of auxiliary equipment to meet these needs in the emergency is a justifiable expenditure.

An adequate amount of essential supplies must be provided, and it is strategically sound to store these supplies in several places in the hospital, rather than to expose a concentrated supply to the hazard of destruction. Safe storage should be provided for alcohol, ether and other chemicals. A census has been taken of radium owned by Boston hospitals, and advice given regarding safe storage.

The safety of patients and personnel should be given primary consideration. None of the methods suggested for the protection of glass, including windows and skylights, can be considered foolproof. Wire netting, cloth and beaver board are but some of the suggestions. It is, of course, logical that at the time of bombing, patients and others be moved away from proximity to glass windows. Corridors appear as reasonable shelters as any other places that have been suggested.

Included in the mobile-unit organization radiating out of every medical depot are Red Cross ambulances and, when necessary, other vehicles provided by the chief medical officer. These will be used for the transportation of patients to hospitals on orders of the physician in charge of the first-aid post.

Care of Casualties

The second objective, the development and maintenance of facilities for the prompt care of casualties, must include adequate space and a well-organized plan for the reception of the injured, and the exercise of proper judgment concerning the disposition to be made of the victims, in accordance with the degree of the injury, and their needs. This calls for continuous, essential, well-equipped professional service, including the availability of surgeons, nurses, anesthetists, x-ray and laboratory units, transfusion facilities and shock teams. It is essential to re-emphasize the need of personnel on a twenty-four-hour basis.

One cannot overestimate the value of the prompt and sound sorting, by the triage officer, of the injured brought to the hospital, and the careful recording of the disposition of the cases. The skillful surgeon assumes a serious responsibility for the making of important decisions concerning: disposition of the walking wounded; patients in need of immediate surgical attention in the operating room; treatment for shock; need of x-ray diagnosis of fracture, foreign objects and so forth; treatment of burns; fracture service; and specialized services, including the orthopedic, eye, nose and throat, neurosurgery, faciomaxillary and those for the treatment of serious chest and abdominal wounds. Doctor Cutler wisely advises constant watchfulness, so that the secondary needs of casualties sent first to the above units may be adequately met. Leadership and authority should be vested in the executive director of the hospital.

Plans must be developed in every community, to assure a working knowledge of the number of available beds for the care of casualties. In communities with a number of hospitals, a central registry of hospital beds must be established, to which the regional and chief medical officers, as well as hospital authorities, will have access for necessary information. At the time of the incident, the medical officer or his deputy will be at the control center, and in possession of this essential information. He will be in periodic touch with hospitals and the deputy medical officer in charge of medical depots and their mobile units. It will be possible, through this constant vigilance, to send victims promptly to the emergency hospitals that have available beds.

In determining the availability of beds for the care of casualties, certain major factors must receive primary consideration. These include the number of available surgeons, nurses, physicians, anesthetists, shock teams and x-ray personnel. The number of available operating rooms is a vital consideration. One must give serious thought to Doctor Baehr's admonition not to overcrowd the individual hospital. He places particular stress on the fact that very few hospitals could adequately care for more than 50 casualties in twenty-four hours. The whole question of adequacy of supplies, including stretchers, blankets, splints, plasma and tetanus antitoxin, must receive proper consideration. It is pleasing, indeed, to pay tribute to the hospitals in Massachusetts that have spent substantial sums for adequate preparation to meet

possible demands made on them at the time of the emergency. Supplies have also been provided, and more are to come from state and federal sources.

Facilities for Evacuation

The availability of beds for casualties is dependent on the organization of sound methods for the evacuation of patients. These include: discharge of convalescents to their homes, nursing and convalescent homes, and other designated places; discharge of wounded patients not requiring hospitalization to the places designated above; and evacuation to base hospitals.

In the event of extensive recurrent bombing, as well as of serious damage to emergency hospitals, it will be necessary to evacuate patients extensively to base hospitals.

Elaborate plans have been developed on a statewide level for the establishment of base hospitals. It is planned to use state sanatoriums for tuberculosis, mental hospitals, institutions under the Department of Public Welfare and, possibly, federal hospitals. Plans for supplemental staff organization are in the process of development. The transfer of wounded from local emergency hospitals to base hospitals is the responsibility of the Women's Defense Corps of the Massachusetts Committee on Public Safety. Arrangements for such transfer will be made by the chief medical officer on request of the representative of the emergency hospital. The medical officer will relay this request to the regional medical officer of the district, who will take the necessary steps for the arrangement of such evacuation.

Requests for the evacuation of patients from the emergency hospitals to their homes will be made to the chief medical officer, who will arrange for needed transportation through the American Red Cross.

Regional hospital officers and a state hospital officer have recently been appointed. Among the functions of the latter are studies of existing hospital resources, including base hospitals, methods and routes for prompt transportation from emergency to base hospitals, essential staff and equipment, and needs.

Decontamination

The subject of decontamination of patients suffering from chemical warfare is of serious concern to hospitals. Emergency hospitals are expected to provide facilities for the decontamination of patients, particularly of the type suffering from both gassing and injury. It is recommended that such facilities be built or made a part of the admitting unit of the emergency hospital.

The decontamination unit should ideally provide for three rooms, thus making the following possible: room for removal of contaminated clothing; room for washing and other essential decontamination treatment; and room for clothing of patients and emergency treatment of wounds. For their protection, attendants should wear masks, gas-proof gloves and clothing. It has been strongly emphasized that decontamination of the patient must be carried out before admission to the hospital for treatment.

* * *

In this description of the place of the hospital in civilian defense and the present status of hospital preparedness, it is fitting to call attention to the problems that the war has created for the hospital structure. Staffs have already been materially depleted. The nursing shortage is constantly increasing, and lay employees are frequently preferring the more lucrative opportunities that industry offers. The needs of the Army and Navy, however, must be met, and the war must be won. Many physicians who have retired from hospital staffs are gladly coming back to fill the gaps created by those who have gone into the Service. Nursing aides are rendering invaluable help in replacement of nurses who have enlisted. Volunteers, who deserve unstinting praise, are frequently taking the place of paid personnel.

In sections of the country where the staffs of hospitals are expected to play the double role of providing for medical services in the field and in the hospital, — and here in Massachusetts, where they are so willingly organizing themselves to care for the injured brought to their doors, — there will be much to do in the event of hostile penetration of our shores.

To the glorious heritage of the hospitals of America, which have grown from a modest total of 150 hospitals less than sixty years ago to their present imposing number of over 6500 institutions, is now added the opportunity for service to the civilian population, exposed to the possible hazards of war brought to their own hearthstones. In planning for the efficient functioning of our hospitals in these times of great stress, one may learn much from the bitter experiences of the hospitals in England. Bitter, however, as was their tragic lot, we salute their indomitable will for service, and we glory in their refusal to be conquered. We join with them in this great privilege for service to our neighbors, in this great enterprise with freedom our goal and, God willing, our reward.

330 Brookline Avenue

MEDICAL PROGRESS

DIAGNOSTIC ROENTGENOLOGY: DANGERS ASSOCIATED WITH FLUOROSCOPY*

RICHARD SCHATZKI, M.D.†

BOSTON

IT is likely that the opportunity for x-ray injuries will increase during wartime. In spite of the efforts of the Army and Navy to use specialized, well-trained radiologists, it can be assumed that quite often fluoroscopies of fractures, as well as fluoroscopies in the search of foreign bodies, will have to be performed by men who have had no, or inadequate, training in radiology, and the possibility of injuries exists. Such a danger appears so imminent that this report is devoted exclusively to its discussion.

Every physician remembers, either from his own experience or from the description of others, the extensive injuries produced by x-rays in the first few years after their discovery. At present, x-rays are used so extensively for diagnostic work and injuries seem to have become so rare that it may appear as if x-rays had lost their dangerous qualities. It is true that in many ways modern equipment is safer than that used in the early days of x-ray investigation. The danger of electrical shock no longer exists in modern shockproof apparatus. Shielding has, in modern types of tubes, eliminated the radiation that formerly escaped from the old glass-bowl type of tube into the examining room outside the field defined by the shutter. But these improvements have not changed the inherent biologic qualities of x-rays. The rays used for the actual examination are still the same that killed a large part of the first generation of radiologists. Owing to technical improvements and particularly to increased knowledge of the inherent qualities of x-rays, the proper application of these rays is no longer dangerous; however, if used excessively and indiscriminately, they obviously will still produce damage. Evidence is accumulating to show that in recent years there has been a disquieting increase rather than a decrease in the number of skin injuries resulting from the use of x-rays.

From 1938 to 1941, Uhlmann[1] saw 70 patients with radiation injuries to the skin. In 40 of these cases, the injuries resulted from the use of x-rays for diagnostic or technical purposes; only in 30 cases were the injuries caused by x-ray or radium treatment. (Fourteen, or about half, of the latter had been treated for nonmalignant lesions!) There were 27 physicians, 4 dentists and 4 physicists among this group of 70 patients, but only 3 of them were radiologists, and they had been exposed to radiation from twenty to forty years. Of the remaining 32, 28 attributed their injuries to diagnostic work: 4 dentists had been accustomed to hold the films in the patient's mouth during the exposure, 4 physicians had been injured while attempting to remove foreign bodies, and 2 pediatricians had been in the habit of holding babies behind the fluoroscopic screen. Among the nonprofessional patients, only 6 had been treated by a trained radiologist. In no case was a radiologist responsible for injuries occurring in the course of diagnostic procedures. Uhlmann emphasizes the high percentage of injuries in physicians due to diagnostic work—a fact that he ascribes to a variety of causes, including "unsatisfactory equipment, inefficient protection, inadequate knowledge of the dangers involved, or simple carelessness, since in some instances the injurious effects are unquestionably due to inexcusable disregard of protective measures."

Leddy and his co-workers,[2-4] in several papers, have stressed the bad effects that result from indiscriminate use of x-rays. From 1919 till 1939, they saw 235 physicians with definite radiodermatitis. Eighty of these physicians were seen within the last six years of this period. The serious character of the radiodermatitis in these physicians is emphasized by the fact that almost 50 per cent of them had either epitheliomas or ulcers due to radiation. In at least 101 cases the damage was attributed to exposure during fluoroscopy. There were only 8 radiologists among the total group, and in only 4 of these was the damage due to fluoroscopy. Leddy and his co-workers found the following main causes of injury: carelessness in the handling of radium and radon—a minor factor; needless exposure of the hands during radiography, for example, in the taking of dental films, the performance of radiopaque injections, the holding of difficult patients and of children, and the holding of casettes in the preparation of complicated

Reprints of articles in this series are not available for distribution, but the articles will be published in book form. The current volume is *Medical Progress: Annual, 1940* (Springfield, Illinois: Charles C Thomas Company, 1941. $4.00).

*From the Department of Radiology, Massachusetts General Hospital.

†Instructor in roentgenology, Harvard Medical School; radiologist, Massachusetts General Hospital.

radiograms; and poorly performed fluoroscopy. As stated above, the last was by far the most important factor. Further investigation showed that none of the physicians in question used lead rubber gloves regularly, and about one third of them used no protective devices whatever. The most dangerous fluoroscopic methods were removal of foreign bodies and reduction of fractures.

Two outstanding facts in Leddy's papers should be emphasized. One is the markedly increasing number of physicians with radiodermatitis whom he had seen in recent years, and the other is the small number of trained radiologists among his patients. Leddy and his co-workers believe that this merits "serious consideration by those who think that roentgen technique is easily acquired and is safe." They add, "The risk involved in the casual use of the roentgenoscope by those without special training cannot be emphasized too strongly, for mechanical equipment cannot be substituted for mental equipment in any branch of roentgenology."

Scheele and Cowie,[5] who recently reviewed the irradiation protection in 45 hospitals, 32 of which had more than two hundred beds, describe the large amount of radiation to which the technicians in some of the departments were exposed, usually because of their own carelessness. One of them received 35 r while holding a single patient — about one hundred and seventy-five times the dose that is considered safe as a daily exposure. Exposures during fluoroscopy, however, were found to be the most excessive ones in this survey, and strong measures to reduce this risk were recommended. In contrast to the findings of Leddy and his co-workers, Scheele and Cowie saw skin damage in 12 out of 60 radiologists. The high incidence found in this survey is probably explained by the fact that finer skin changes were included among the 12 physicians, although epitheliomas were seen in some of them.

To these reports of the recent literature, I should like to add two personal experiences that may illustrate the situation. A few years ago I saw a young physician who had been an intern in one of the large hospitals of this country. One day, a patient with a difficult fracture of both bones of the forearm entered the hospital. While trying to reduce this fracture, the doctor used a shockproof portable unit. He had had no particular training in roentgenology and thought the machine was perfectly safe. Because the unit was shockproof, it was possible for him to put the patient's arm close to the tube, and he soon discovered that by so doing his fluoroscopic light was much brighter. Not satisfied with his reduction, he tried again the next morning and fluoroscoped extensively. The results of these two fluoroscopies were bad burns for both the patient and the doctor. When I saw the doctor, he had lost the terminal phalanges of two fingers, and had severe radiation damage of two additional fingers of both hands (see Fig. 11: Daland[6]). In other words, extensive burns are still possible from the use of x-rays in the examination of a single patient, if the examination is not done with the necessary precaution.

The following event, which happened recently in Boston, demonstrates the degree of ignorance that may be combined with the possession of x-ray equipment. A physician called up a salesman of x-ray apparatus, told him that he was dissatisfied with his x-ray equipment and wanted some machine that would not burn. A surgeon might just as well ask for a knife that would not cut!

In summary, one may say that (1) x-ray injuries still occur, and there is evidence that they are increasing in number in recent years; (2) that a large number of x-ray injuries occur during diagnostic examinations — it is even likely that, at present, more injuries occur from such procedures than from the therapeutic application of x-rays; (3) that modern shockproof x-ray equipment does not prevent the occurrence of x-ray injuries and, although of great advantage to the skilled worker, is, if used unintelligently, in some respects even more hazardous than the old, nonshockproof equipment, because it allows a dangerously close approach of the patient and of the doctor's hands to the x-ray-producing target[7]; (4) that the commonest cause of injuries is the inadequate knowledge of the examining physician, who does not know enough about the technical setup of his equipment and does not realize the dangers that may involve the patient and himself — the second commonest cause is carelessness; and (5) that severe injury to the patient and the physician may occur from a single faulty examination.

How can radiation damage be avoided? Fluoroscopy is the outstanding cause of radiation injury, and is of the greatest consequence in fracture and foreign-body work, particularly during wartime. Further discussion is therefore confined to the elimination of fluoroscopic hazards. The safest way of avoiding injury is the complete omission of fluoroscopy. The British Emergency Medical Service[8] has circulated a memorandum to all medical officers in which it emphasizes the danger of poorly performed fluoroscopies. According to this memorandum, fractures and foreign bodies should be fluoroscoped only in exceptional cases. The advantages of fluoroscopy are, however, too great in many cases for it to be omitted, but it should be performed by a roentgenologist whenever possible. If this is not feasible, the examining

doctor should be instructed and supervised by a roentgenologist, who should also examine the technical equipment. Furthermore, whoever does fluoroscopy should realize that the danger of radiation damage exists, that the amount of danger is in direct proportion to the amount of exposure, and that it can be avoided.

What is the safe dose to which the patient can be exposed? The dose should be smaller than that which will produce an erythema of the skin — less than approximately 300 r for the type of radiation in question. Because of the variation that may occur in the output of any diagnostic x-ray equipment, not more than half this dose can be considered safe. The output of different machines varies, and can be determined only by actual measurement. Measurements at the Massachusetts General Hospital, performed by Mr. Oliver E. Merrill, showed a variation between 14 and 25 r per minute, measured on the tops of different fluoroscopic tables. The distance of the table top from the target of the x-ray tube varied between 34 and 39 cm.; the measurements were made with 80 kilovolts and 4 milliamperes. In other words, with the setup in this department, actual fluoroscopic time from six to ten minutes can be considered safe, the time varying from machine to machine. It is obvious that this dose should not be repeated frequently at short intervals.

Increase in milliamperage increases the amount of radiation correspondingly. Decrease in the target-skin distance increases the amount of radiation by the square of the distance: that is, if the distance between the target and skin is only 20 instead of 40 cm., the amount of radiation will be four times larger. Insufficient realization of this law is one of the common causes of injuries, especially in modern shockproof equipment, which enables one to come close to the target. Actual measurement shows that 462 r per minute are delivered by the tube of a shockproof portable machine if the ionization chamber is in contact with the tube; in other words, the safe dose defined above at this distance would be delivered in twenty seconds.

Which dose can be considered safe for the examining physician? It is obvious that it must be much smaller than the dose safe for the patient, because of the repeated exposures to which the operator is usually submitted. Never, under any circumstances, should the palpating hand or any other unprotected part of the examiner's body be in the direct beam of the x-rays. The importance of this rule cannot be overemphasized. However, the examiner cannot avoid being exposed to a certain degree of so-called "scattered rays," which are produced secondarily by objects in the direct beam. Every fluoroscopic room shows some scattered radiation, which can be demonstrated by the use of a portable fluoroscopic screen or by small dental films, and can be measured accurately by the ionization chamber. It is obviously difficult to determine the amount of exposure to scattered radiation that can be considered safe. Answers to inquiries made by investigators in various countries among roentgenologists who for many years had been exposed to scattered radiation vary in the amount of so-called "safe scattering." The majority of the investigators believe that 0.2 r daily exposure of the total body will do no damage. Scattered radiation is quite unimportant when the dangers connected with fluoroscopy of fractures and foreign bodies are considered. If damage is done by these examinations, it is caused by direct irradiation.

The necessary protective measures are as follows:

Equipment. It is assumed that standard modern equipment is available for the examiner. The tube is shielded and probably shockproof. A filter is in the tube, and if actual measurement shows too large an output, another filter should be added.

The fluoroscopic equipment should include a shutter with which the direct beam can be reduced to the actual size needed. The fluoroscopic screen should be rigidly connected with the tube and should be large enough so that it will be difficult or impossible for the direct beam to go beyond the confines of the screen. A lead glass of sufficient thickness should be in front of the screen. The patient should be placed so that there is a safe distance between his skin and the target of the tube. As described above, the intensity of x-rays decreases with the square of the distance. The output of the x-ray machine varies with the amount of milliamperage and voltage. If 6 milliamperes are used, the output will be one and a half times as much as that with 4 milliamperes. Increase in the kilovoltage from 80 to 90 will double the actual exposure on the patient's skin. The sides of the machine should be constructed so as to emit as little scattered radiation as possible. A primary cone, which is a cone attached to the x-ray tube, is of particular advantage for this purpose. This cone should come as close as possible to the top of the table on which the patient is examined.

Fluoroscopic Technic. Fluoroscopy is an art. The greater the care with which it is performed, the better the results and the less the danger for patient and examining physician. Fluoroscopy should be performed in a completely darkened room. The examiner should not be disturbed by any outside light entering the room at any time. A red light should be connected with the foot switch

so that it will turn on automatically when the current of the machine is interrupted. The examiner should adapt himself with dark glasses, or by sitting in a darkened room, for at least fifteen minutes. To overcome poor visual adaptation by an increase in the tube current is a poor policy. Such a procedure does not compensate for the loss of diagnostic acumen and represents an inexcusable increase of the fluoroscopic risk. An excellent description of physiology and practice of adaptation is given in a recent article by Chamberlain.[9] Simple ways for testing the optimal degree of adaptation are outlined. In the same article, Chamberlain prophesies the application of the principles of television and ultramicroscopy for fluoroscopy. By amplification, unheard of brilliancy of the fluoroscopic light would result, which would minimize the risk of fluoroscopy and revolutionize roentgenology.

The actual fluoroscopic exposures should be as short as possible. The current should be shut off when it is not actually needed for observation — for example, during discussions or demonstrations. A shutter should be used to define the fluoroscopic field. Keeping the shutter opening as small as possible has a threefold advantage: it improves the fluoroscopic image and decreases the danger to the patient and to the doctor.

Since any handling of a fracture during fluoroscopy markedly increases the risk of the examination, fluoroscopy should be used only to check an obtained position. As emphasized above, the hand of the examiner should never appear in the direct beam of the x-rays. He should wear lead rubber gloves and a lead rubber apron.

Measurement. The actual amount of x-rays to which patient and doctor are exposed should be measured by an ionization chamber. Wherever this is not possible, and I can think of many places where it will not be, particularly under war conditions, the machinery should be carefully checked as outlined above, if possible by a physicist or a roentgenologist, for protection against overdosage and correct definition of the direct beam. The scattered radiation can be fairly easily demonstrated with the help of dental films, which are placed at various exposed areas or, simpler still, with the aid of a portable fluoroscopic screen. A small amount of fluorescence will be present in any fluoroscopic room, owing to the scattering. A leak in the protection, however, can be readily discovered by the locally increased intensity of light seen on the portable screen, and the leak can be obliterated.

Personnel. The attitude and training of the examiner are the most essential factors in the protective scheme. A well-trained, conscientious examiner can use obsolete equipment safely, whereas an ignorant or careless worker can do irreparable damage with the most modern equipment. An adequate fluoroscopic technic can be learned only through personal teaching. Good descriptions of fluoroscopic technic[10] are helpful but they are not substitutes for such personal training.

Physical data regarding protection, more extensive than those presented in this review, can be found in a number of recent publications.[11–13]

* * *

Modern x-ray equipment does not prevent x-ray injuries. In some respects, it is even likelier than oldfashioned machines to produce damage, if used without the necessary knowledge. There is evidence that in recent years there is an actual increase in the number of persons injured by diagnostic procedures. The physician who "does a little x-ray work" is in greater danger than the expert roentgenologist, and it is he who needs protection.[2] Whoever uses x-ray equipment, particularly for fluoroscopic purposes, should realize the danger to which he exposes the patient and himself, and he should be certain that all possible points of danger have been eliminated; otherwise, serious damage may result.

References

1. Uhlmann, E. Significance and management of radiation injuries. *Radiology* **38**:445-452, 1942.
2. Leddy, E. T. The dangers of roentgenoscopy: summary and recommendations. *Am. J. Roentgenol.* **28**:924-927, 1937.
3. Leddy, E. T., and Rigos, F. J. Radiodermatitis among physicians. *Am. J. Roentgenol.* **45**:696-700, 1941.
4. Stevenson, C. A., and Leddy, E. T. The dangers of reducing fractures under the roentgenoscope and methods of protection against them. *Am. J. Roentgenol.* **37**:70-82, 1937.
5. Scheele, L. A., and Cowie, D. B. Radiation protection in forty-five hospitals. *J. A. M. A.* **117**:588-591, 1941.
6. Daland, E. M. Radiation damage to tissue and its repair. *Surg., Gynec. & Obst.* **72**:372-383, 1941.
7. Hampton, A. O. The reduction of fractures under fluoroscopic control. In Scudder, C. L. *The Treatment of Fractures.* Eleventh edition. 1208 pp. Philadelphia: W. B. Saunders Company, 1938.
8. Danger of setting fractures and removing foreign bodies under the x-ray screen: A memorandum circulated to the Emergency Medical Service and published by the permission of the Ministry of Health. *Brit. J. Radiol.* **14**:344, 1941.
9. Chamberlain, W. E. Fluoroscopes and fluoroscopy. *Radiology* **38**:383-413, 1942.
10. Barclay, A. E. *The Digestive Tract: A radiological study of its anatomy, physiology, and pathology.* Second edition. 427 pp. London: Cambridge University Press, 1936.
11. International recommendations for x-ray and radium protection: revised by the International X-ray and Radium Protection Committee at the Fifth International Congress of Radiology, Chicago, September 13-17, 1937. *Am. J. Roentgenol.* **40**:134-138, 1938.
12. Taft, R. B. Stray radiation under actual conditions. *Am. J. Roentgenol.* **46**:373-375, 1941.
13. Taylor, L. S. X-ray protection. *J. A. M. A.* **116**:136-140, 1941.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 28271

PRESENTATION OF CASE

A sixty-year-old unemployed carpenter was admitted to the hospital because of cough of five months' duration.

Two years before entry, the patient fell, striking his lower right chest against a stake. A roentgenogram was said to show questionable fracture of the eighth rib near the spine. After this, the patient began to have periodic pain in the region of the right nipple, occasionally radiating through to the back, to the right side of the neck and occipital region, or to the right axilla and right upper arm. These attacks occurred once or twice a week, and frequently accompanied damp weather or the lifting of heavy objects. The pain was sharp and intermittent. The patient was otherwise well and was able to continue his work. Eight months before entry, there was some loss of appetite. Five months before entry, there was gradual appearance of cough productive of two or three tablespoonfuls of white sputum. The attacks of pain were aggravated by the cough. After a few weeks, the patient began to feel nauseated. Attempts at vomiting increased the cough. The sputum became foul, leading the patient to consult a physician. A roentgenogram of the chest was said to show "clouding of the right lung." The patient was given green liquid medicine and white pills. He remained in bed for about a month, with some resultant improvement in his general condition, and then returned to work. The sputum became increasingly foul and turned green. Two and a half months before entry, the sputum became pink, up to half a pint a day being raised. Gradually, the sputum became frankly bloody. Two months before entry, the patient was forced to stop work because of shortness of breath. There was a weight loss of 10 or 15 pounds in the course of the illness.

The past and family histories were irrelevant. Venereal disease was denied.

On admission, examination showed a poorly nourished, chronically ill man of middle age, coughing and orthopneic. The veins over the neck and arms were prominent, more so on the left than on the right. The heart was of normal size, with a rough systolic murmur at the aortic area, poorly transmitted to the neck. Coarse rales were heard throughout the right chest, with occasional loud expiratory squeaks and groans over the right upper lung field. There was dullness over an area corresponding to the right upper lobe anteriorly, posteriorly and in the axilla. Breath sounds and vocal and tactile fremitus, however, were not altered in this area. A few small cervical lymph nodes and a solitary left supraclavicular node were palpable but not tender. The liver edge lay just below the costal margin. The abdomen was otherwise normal. There was early clubbing of the fingers. Neurologic examination was negative.

The blood pressure was 110 systolic, 55 diastolic, in the right arm and 105 systolic, 60 diastolic, in the left arm. The temperature was 99°F., the pulse 130, and the respirations 25.

Examination of the blood showed a red-cell count of 4,500,000 with 13 gm. hemoglobin, and a white-cell count of 16,000 with 84 per cent polymorphonuclears. The blood Hinton reaction was positive. The urine was normal. Culture of the sputum showed no beta hemolytic streptococci.

A roentgenogram of the chest showed a huge irregular cavity occupying a completely consolidated right upper lobe. The cavity was about 6 cm. in diameter, and there were multiple nodular projections along its margins. There was only a small quantity of fluid. The arch of the aorta was dilated and prominent, with a suggestion of calcification. The heart was of normal size and shape. The ascending aorta was questionably prominent. There was no definite evidence of bone destruction in the ribs or vertebras.

The patient continued to drain large amounts of foul-smelling sputum. He was given sulfadiazine. The temperature fluctuated irregularly between 98 and 105°F. On the eighth hospital day, coarse rhonchi were audible throughout both lung fields. The patient became increasingly weaker, and cyanosis appeared. He was given gomenol, with good relief from the foul odor of the sputum. Death occurred later in the day, apparently from respiratory failure.

DIFFERENTIAL DIAGNOSIS

DR. EDWARD D. CHURCHILL: We know that breath sounds are widely transmitted throughout the chest. I examined a man yesterday whose entire right lung had been removed three years previously; in the right axilla, there were normal breath sounds, tactile fremitus and vocal resonance. He had a thoracoplasty, but the transmission of the sounds from the left lung suggested a normal right lung in the axillary region. Pulmonary resection is giving us a new concept about

transmission of sounds into the area over which one is listening with a stethoscope. The x-ray film in the case under discussion makes it obvious that the underlying lung could not produce normal breath sounds. They must have been coming through from adjacent segments of lung.

"There was early clubbing of the fingers." I do not like the term "early." It implies that in a few months it will increase. We have no evidence for that. Some diseases give slight clubbing, others extreme clubbing, and others no clubbing of the fingers. The term "early" means slight or moderate.

I often wish we had a more ample terminology to describe the odor of the sputum because so often the diagnosis can be made by this means alone. Varying odors of the sputum are like the bouquets of vintage wines. The word "foul" does not mean anything and, in addition, always startles the patient. It may be more informative to ask if the sputum has a bad taste. The patient will tell you that his sputum tastes bad, but if you ask if it is "foul," he will say no. It is unfortunate that we are lacking a precise descriptive vocabulary for the subtle odors so useful in clinical medicine.

The x-ray film is quite important. There is a huge irregular cavity within a homogeneously dense right upper lobe (Fig. 1). The X-ray Department are overstepping when they refer to a "consolidated" right upper lobe if they imply consolidation in the pathologic sense. The cavity is 6 cm. in diameter. There are multiple nodular projections along its margins.

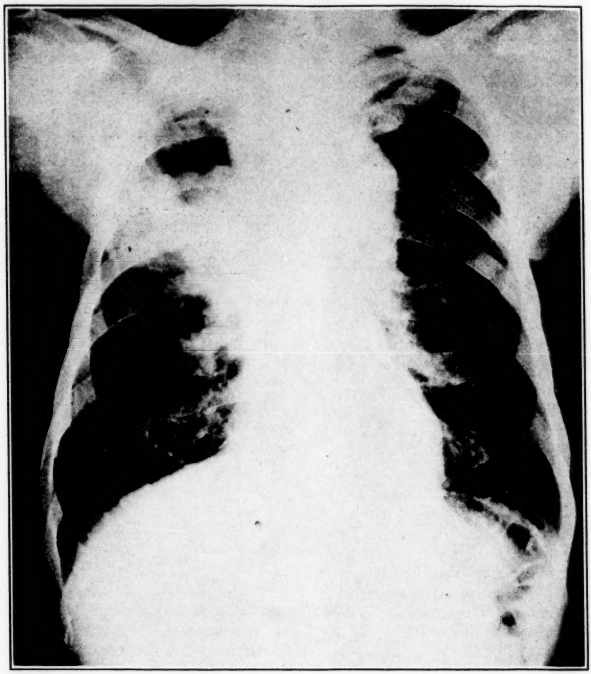


FIGURE 1.

Will you comment on the x-ray film, Dr. Schatzki? Do you care to make a more clearly definitive statement regarding calcification and prominence of the ascending aorta?

DR. RICHARD SCHATZKI: There is definite calcification in the arch of the aorta. I should say that the ascending aorta is dilated, and also the arch. The descending is normal in size so far as I can see on the film.

DR. CHURCHILL: Is the heart of normal size?

DR. SCHATZKI: Yes.

DR. CHURCHILL: Is there anything to add to the description of the cavity?

DR. SCHATZKI: I think it is a fairly good description. You are right in considering the term "consolidation" a poor one. It is very often erroneously used in the sense of density, as you know.

DR. CHURCHILL: Let us take up the question of cardiovascular disease. There was a positive blood Hinton reaction, a dilated aorta, with calcification in its walls, a rough systolic murmur over the aortic area and a blood pressure of 110 systolic, 55 diastolic.

Dr. Breed, do you want to pick that up from the medical standpoint and tell us what was wrong with the cardiovascular system?

DR. WILLIAM B. BREED: I do not believe that the variation of blood pressure between the right and left arms was more than normal. The mere recording of such figures tends to call more attention to the variation than is justified. The pulse pressure of 50 to 55 without an aortic diastolic murmur is not particularly significant, and in the x-ray picture the possibility of syphilitic aortitis is not so likely as an arteriosclerotic aorta in a man of sixty. However, I should like to question Dr. Schatzki a little more specifically on that point — can one differentiate by this x-ray film a syphilitic from an arteriosclerotic process?

DR. SCHATZKI: You mean so far as tortuosity and dilatation of the aorta are concerned. In a large number of cases of syphilitic aortitis, we call the aorta normal, knowing that we cannot see significant pathologic changes in many of them. We usually make an understatement rather than an overstatement in that respect — it is better not to call the aorta dilated than the other way around. But when we say dilatation, I think it is quite dilated, and this particular aorta was dilated in that sense. There is not such a degree of dilatation in arteriosclerosis unless there is a dissecting arteriosclerotic aneurysm.

DR. BREED: You never speak of a tortuous aorta as dilated?

DR. SCHATZKI: We should not per se. I think that is a definite mistake.

DR. CHURCHILL: Do you say that this was syphilitic aortitis?

DR. TRACY B. MALLORY: How about the calcification?

DR. SCHATZKI: I should say that syphilitic aortitis with dilatation shows calcification in a very large percentage of cases. As a matter of fact, the presence of calcification rather proves than disproves the diagnosis, particularly if the calcification is in the ascending aorta.

DR. CHURCHILL: Do you agree with that, Dr. Mallory?

DR. MALLORY: I agree with Dr. Schatzki that calcification in the thoracic aorta is unusual in the arteriosclerotic aorta except in advanced cases; in the abdominal aorta, it is a different proposition.

DR. SCHATZKI: I cannot see calcification in the ascending aorta. We often see calcification in the arch of an arteriosclerotic aorta, just where we see it in this particular case. If it were in the ascending aorta, it would be more in favor of syphilis.

DR. MALLORY: I should have qualified my statement. Calcification is common in the arch. A favorite spot is the dimple of the ductus arteriosus. In the ascending and frankly descending portions, I do not believe we often see it.

DR. SCHATZKI: We do in very advanced cases.

DR. CHURCHILL: Dr. Breed, you are still my medical consultant. What do you call this?

DR. SCHATZKI: If the patient had no definite evidence of regurgitation, I do not see how we can decide the question. Is that right?

DR. BREED: Yes; he had no diastolic murmur. This does not rule out syphilitic aortitis, but it is evidence against it.

DR. SCHATZKI: The fact that the heart shadow was normal probably rules out aortic regurgitation.

DR. BREED: Yes, probably.

DR. FULLER ALBRIGHT: Was the aortic second sound recorded?

DR. MALLORY: There is no note on that.

DR. CHURCHILL: Then you interpret this, Dr. Breed, as syphilitic aortitis?

DR. BREED: I shall take the arteriosclerotic side, for the sake of argument.

DR. SCHATZKI: I shall take the syphilitic side.

DR. CHURCHILL: We know that the patient had a pulmonary abscess, with a fluid level in a cavity and foul sputum. The only question is, Was this abscess in the center of a cancer, or was it not? We have no direct evidence for cancer other than the x-ray film and the course of the patient, which, however, is perfectly consistent with a noncancerous lung abscess. The history and physical examination do not point either way. The question whether or not this was an abscess within a cancer comes down solely, it seems to me, to interpretation of the film. I maintain that the thickened wall, with the nodule extending into the cavity, indicates that it was a necrotic tumor — a primary cancer. I can come to no other diagnosis. That is an x-ray diagnosis, and I should like to check it with Dr. Schatzki.

DR. SCHATZKI: You must remember the cases in which we used the same reasoning and were wrong! In those cases, a markedly irregular out-

line of the inside of the cavity turned out to be caused by debris in an abscess.

DR. CHURCHILL: I do. The debris abscess gives a thumbnail appearance, rather than the picture presented by this case.

DR. SCHATZKI: I agree; and from this film I should not hesitate to call it cancer.

DR. CHURCHILL: I can reach no other conclusion on the evidence. The clinical course could go with either. So that, purely on the x-ray visualization of the lesion, I say lung abscess within a primary cancer of the lung.

DR. CHURCHILL: I can mention it.

DR. COPE: And would you exclude it?

DR. CHURCHILL: Not definitely. I can mention it as one of the things that turn up now and then when we are wrong. It is like the safeguard of the medical student who always puts syphilis down at the end of a list to include everything in his differential diagnosis; it might be syphilis.

CLINICAL DIAGNOSES

Carcinoma of lung, with secondary abscess.
Syphilitic aortic aneurysm.

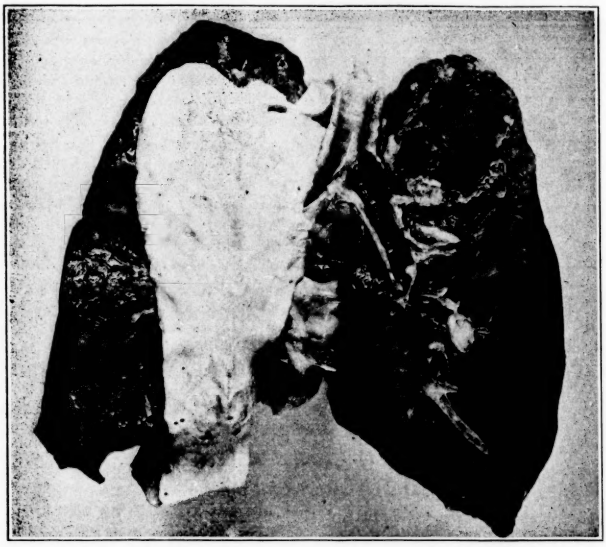


FIGURE 2.

DR. MALLORY: Do you accept Dr. Breed's or Dr. Schatzki's opinion regarding the aorta?

DR. CHURCHILL: I have no competence to decide between them. I shall let the two gentlemen argue it out.

DR. BREED: Dr. Albright suggests that if this was cancer in the right upper lobe, it may have pushed the aorta over to make it appear larger than it was. I think that is a good point.

DR. SCHATZKI: I think we can differentiate between tortuous aorta and dilated aorta if it is markedly dilated.

DR. MALLORY: Would anyone care to defend a primary aneurysm occluding a bronchus by external pressure and secondary abscess of the lung?

DR. CHURCHILL: I am not willing to accept this as aneurysmal phthisis.

DR. OLIVER COPE: Would Dr. Churchill mention gumma with abscess?

DR. CHURCHILL'S DIAGNOSES

Carcinoma of lung, with secondary abscess.
Cardiovascular disease involving aorta, nature undetermined by medical and radiologic consultants.

ANATOMICAL DIAGNOSES

Carcinoma of upper-lobe bronchus of right lung, with secondary abscess.
Metastasis to regional lymph nodes and left adrenal gland.
Syphilitic aortitis with aneurysm.
Bronchopneumonia, terminal.
Urolithiasis medicamentosa (sulfadiazine).

PATHOLOGICAL DISCUSSION

DR. MALLORY: Autopsy showed a mediastinum filled with a large aneurysm, syphilitic in origin. It replaced the arch, half the ascending and al-

most two thirds of the descending aorta, stopping sharply at a point about 4 cm. above the diaphragm. Figure 2 shows the thoracic organs viewed from behind. The dilated descending aorta has been reflected over the left lung. The cavity in the right upper lobe appears black, and a white tumor nodule is visible in the bronchus to the upper lobe. Smaller tumor masses surround the cavity. The syphilitic aneurysm was apparently coincidental and had nothing to do with the symptoms.

DR. BREED: Then it is merely an academic discussion of x-ray diagnosis. The disease had nothing whatever to do with the patient's health or death.

DR. MALLORY: So far as this cardiovascular syphilis is concerned?

DR. BREED: Yes.

DR. MALLORY: That is true.

There were metastases to the adrenal glands. These were the only distant metastases found.

DR. CHURCHILL: Was it an epidermoid carcinoma?

DR. MALLORY: It was so undifferentiated that we did not classify it.

DR. SCHATZKI: Where did the dilatation start?

DR. MALLORY: It began shortly above the valve, 1.5 cm. to be exact, but was only slight, measuring 8 cm. in circumference up to the arch; then it widened to 10 and 14 cm. farther on.

CASE 28272

PRESENTATION OF CASE

A thirty-nine-year-old housewife entered the dental clinic of the hospital complaining of a growth of tissue on her gum.

The patient had always been negligent of her teeth, occasionally pulled the loose ones herself, and eighteen years before admission had had fifteen teeth extracted. Seven years before admission, she noticed in the left upper jaw a painless growth of tissue that occasionally bled and gradually increased in size, but had remained the same for the previous three years. She had had no dental care in seven years. Examination showed a large mass of hypertrophied tissue about 3 cm. in diameter overlying the maxilla in the left cuspid area. It was firm, attached by a very hard pedicle, and had a fissure running through it in the anteroposterior direction. A tentative diagnosis of epulis was made, and the patient was referred to the medical service for blood calcium and phosphorus studies.

On the medical service, it was learned that four years before admission the patient slipped and fell, fracturing her scapula and right patella. While in bed, she gained about 70 pounds in weight. The bones healed readily, although the patella remained displaced. Two years before entry, the patient was sick for one month with low-back pain, fever and chills unaccompanied by frequency, dysuria, hematuria or changes in the appearance of her urine. Eight months before entry, she noticed in the left neck a constant soreness, which radiated to the head and seemed worse immediately before the menstrual periods; she attributed this pain to the growth in her mouth. Dizziness and vomiting without nausea appeared five weeks before entry. The vomitus was green and watery, had no relation to meals, and occurred approximately every other morning. These symptoms were accompanied by a great thirst and craving for sour fluids. In general, the appetite was small, and the patient rarely ate sweets, milk, bread or cheese.

The patient had had the usual childhood diseases and, thirteen years before admission, a cholecystectomy and appendectomy. Her father had died at fifty of hemophilia, and her mother at fifty of diabetes. One sibling died at twenty-five of tuberculosis. She stated that her sister's children and her own two offspring might have hemophilia.

On examination, the patient was well developed and extremely obese, but appeared well. The skin was clear and of fine texture, and there was a large scar in the left breast. On the dorsum of the third left metacarpal bone was a hard tumor measuring 3 by 5 cm. There were marked pyorrhea and caries of the remaining teeth, and in the maxillary left cuspid area there was the lesion observed in the dental clinic. Examination of the heart, lungs and abdomen was negative. The right patella was displaced upward above the knee joint. Examination of the fundi and nervous system was negative.

The blood pressure was 140 systolic, 95 diastolic. The temperature was 98 to 100°F., the pulse 90, and the respirations 20.

Examination of the urine showed a +++ test for albumin, an occasional hyaline cast, and a +++ Sulkowitch test for urinary calcium. A urinary-concentration test was normal, and a phenolsulfonephthalein test yielded 18 per cent of the dye in fifteen minutes and another 10 per cent in thirty minutes. Examination of the blood showed a red-cell count of 4,190,000 with a hemoglobin of 82 per cent, and a white-cell count of 7500 with 54 per cent polymorphonuclears. The serum calcium ranged from 13.8 to 16.6 mg. per 100 cc., the phosphorus from 0.92 to 2.3 mg. per 100 cc., and the phosphatase from 3.3 to 9.7 Bodansky units. The nonprotein nitrogen of the blood serum was 17 mg. and the proteins 6.8 gm. per 100 cc. A blood

Hinton reaction was negative. The stools were guaiac negative.

X-ray films of the teeth showed absent lamina dura, with marked alveolar absorption about many, and severe caries. There was a cyst involving the alveolar process of the left upper jaw in the incisor, cuspid and bicuspid areas. The bones of the vault had a mottled appearance because of multiple small areas of rarefaction. The bones of the skeleton were decalcified. There was a large cyst involving the proximal phalanx of the left middle finger, another involving and expanding the third right metacarpal and a smaller cyst in the first right metacarpal; a fourth was present in the carpal scaphoid on the left. There was an old fracture of the left patella, with dehiscence of the fragments, and a supranumerous high epicondyle in the left humerus. X-ray films of the chest showed enlargement of the heart in the region of the left ventricle and a tortuous aorta. No pathologic mass was seen in the upper mediastinum. The diaphragm was slightly high, but there was no evidence of intrapulmonary disease. The esophagus was demonstrated by barium and was normal.

An electrocardiographic recording showed a normal rhythm, a rate of 84 and a PR interval of 0.15 second. There was slight left-axis deviation, sagging ST interval in Leads 1 and 2, slight inversion of T_3 and diphasic T_4.

One month after admission, an exploration of the neck for parathyroid tumor was performed. Both upper parathyroid glands were identified and appeared normal. No others were found.

Differential Diagnosis

Dr. Jacob Lerman: I should like to comment on several points in the history and physical examination. The presenting symptom was that of a painless lesion of the left upper jaw, slowly growing and obviously not very malignant. The next significant feature was the story of fractures resulting from slight trauma. This immediately suggests pathologic fractures; good healing is consistent with some types of pathologic fractures. The gain of 70 pounds in weight does not seem to be significant; the low-back pain, fever and chills are difficult to explain. The evidence is against urinary infection. The soreness in the left neck is also difficult to explain. If it was due to a lesion similar to the one in the jaw, the exacerbation before menstrual flow is understandable. The change in electrolyte balance that occurred premenstrually may have increased the volume of an encapsulated or enclosed mass so as to produce increased pressure. The dizziness and vomiting appeared to be nonspecific in origin. The abdominal operation raises the possibility of adhesions as a cause for vomiting. However, the absence of pain is against this. The thirst and craving for fluids may have been caused by vomiting, by excessive excretion of sugar or electrolytes, or by symptoms of diabetes insipidus. The low intake of milk and cheese is significant.

Physical examination gives us the information of a tumor of the left hand, in addition to the one in the jaw. I cannot tell whether this tumor was part of the bone or merely adherent to it.

The important laboratory data consist of a high blood calcium, low blood phosphorus, +++ Sulkowitch test and normal to slight elevation of phosphatase. There was evidence of slight renal impairment — namely, a +++ test for albumin and occasional hyaline cases. The tests for renal function were negative. The serum protein was normal. The significant findings by x-ray were the absent lamina dura, cysts in the jaw and hand, areas of rarefaction in the vault, decalcified skeleton and old fracture of patella. The electrocardiographic changes, in the absence of digitalis, suggest coronary disease in the menopause. I cannot see why hypercalcemia should produce these electrocardiographic changes. One would rather expect changes in conduction as a result of high blood calcium.

The most logical diagnosis is primary hyperparathyroidism. The evidence for this consists in the probable pathologic fractures, dizziness, vomiting, thirst, bone cysts, bone decalcification in the presence of a low calcium intake, changes in the teeth by x-ray, hypercalcemia, low blood phosphorus and hypercalcinuria. The slight renal damage is of the type seen in this disease. The relatively low phosphatase is somewhat unusual.

Several other conditions must be considered. One is secondary hyperparathyroidism; there was not enough renal damage to cause retention of phosphorus. Metastatic bone lesions, lymphoma involving bones and sarcoid are others. Any of these conditions may give a high calcium in the blood and urine, but the phosphorus is either normal or elevated. The duration of the condition and appearance of the skull in the case under discussion are against malignant lesions. Multiple myeloma is suggested by the skull plates, high blood calcium, albuminuria, low blood phosphorus, absence of Bence-Jones proteins in the urine, normal serum protein and bone cysts. If renal damage is produced by multiple myeloma, one may get the secondary type of hyperparathyroidism. Rapid mobilization of calcium results from immobilizing the greater portion of the skeleton, the blood stream being flooded with calcium and phosphorus; there is nothing to suggest the situation in this case.

Dr. Albright and I have followed 2 patients in this hospital and Dr. John Howard has followed 1 at Johns Hopkins Hospital with the following characteristics: high blood calcium and phosphorus, high urinary calcium, advanced renal damage, elevated serum protein, no Bence-Jones protein and negative sternal biopsies. The only common finding in all these cases was a history of excessive intake of calcium and alkali. This patient does not belong to this group because the renal damage was not extensive, the serum protein was normal, the phosphorus was low and the intake of calcium was low.

In conclusion, I must say that hyperparathyroidism, due either to generalized hyperplasia of all the parathyroids or to an adenoma of one parathyroid, is the most probable diagnosis. Since the surgeon did not confirm this, there are certain possible explanations. The surgeon may have been mistaken about the character of the parathyroid glands, and the pathologist may have discovered either hyperplasia or a small adenoma. The patient may have died, and the pathologist may have discovered the true nature of the disease. Knowing the perseverance of the surgeons, I suspect that a second search was made, and, as often happens, a parathyroid adenoma was found elsewhere.

Clinical Diagnoses

Hyperparathyroidism.
Parathyroid adenoma of mediastinum.

Dr. Lerman's Diagnoses

Hyperparathyroidism.
Parathyroid adenoma of mediastinum.

Anatomical Diagnoses

Hyperparathyroidism.
Parathyroid adenoma of mediastinum.

Pathological Discussion

Dr. Oliver Cope: Dr. Lerman's surmise is correct; a second operation was performed in search of a parathyroid tumor. I have brought along a colored motion picture to show you as proof. Such pictures are expensive to make, and I should not have had this one taken of the operation if we had not been reasonably sure of the diagnosis of hyperparathyroidism.

It is fair to say that Dr. Lerman was not given all the evidence that is now available, or should be available, to the surgeon trained in the care of this disease. The two parathyroid glands disclosed at the first operation in the neck were not normal. They were atrophic, and should have been termed "uninvolved." In the presence of an adenoma, the uninvolved glands are not called on to function and undergo an atrophy of disuse. This atrophy apparently affects only the epithelial cells, and the proportion of fat therefore rises and the color changes more to that of normal fat. It is only recently that I have been able to recognize this difference in gross appearance between the normal and uninvolved glands. This has come only by comparing the normal glands seen in patients with thyroid disease and those of patients explored in search of a parathyroid tumor who turn out not to have one with the uninvolved glands seen in patients proved to have hyperparathyroidism due to an adenoma. Microscopically, this atrophy is difficult to identify, since normally there is a considerable variation in the proportion of fat to epithelial cells; in gross at the operating table, however, the finding of a small, yellower than normal parathyroid gland does suggest the presence of an adenoma in one of the other parathyroid glands.

Having searched the neck and the posterior mediastinum at the first stage in this patient, I left the operation reasonably sure that a tumor existed in the anterior mediastinum. The presence of an adenoma had been excluded in all other possible positions in which parathyroid glands can occur. The anterior mediastinum, alone, remained. The motion picture is therefore of the exploration of the anterior mediastinum. The first step in the exploration is to expose the anterior surface of the sternum. An opening is made along the sternum in the right third interspace by insertion of a finger. The pleura is depressed and then pushed laterally. Another finger is inserted above in the manubrial notch. These are brought together beneath the sternum, and a free passage is made for the sternal knife. The pleura and pericardium are then carefully separated further by blunt dissection as the two portions of the sternum are retracted laterally. The anterior fascia within the anterior mediastinum is then opened into. At this point, we spied an adenoma lying anterior to the ascending aorta, slightly on the right side. One can see, on the far side of the incision, the pleura of the left side. The adenoma now appears in the center. It is quite a large flat tumor, and at its upper pole there are no blood vessels. As the tumor is lifted into the field, the entire vascular pedicle is at its lower pole. The arterial branches come from the mediastinal vessels feeding the upper pericardium. The position of the vascular tree is an important point. Several articles in the literature suggest that if a parathyroid adenoma exists in the mediastinum, a vascular pedicle will be found leading from the thyroid gland down into the chest. This may be true if the parathyroid gland, at the end of embryologic development, resides somewhere near the thyroid and is displaced into the mediastinum later, when it is enlarged by

the adenoma. Such displacement occurs partly by the motion of the larynx and thyroid region with swallowing, and partly by the negative intrathoracic pressure. But in this patient we believe that the parathyroid tissue arrived in the anterior mediastinum during its embryologic development. It came down with the thymus from the upper or third branchial cleft, and it derived its blood supply from the neighborhood in which it finally resided. When the adenoma developed in this gland, the blood supply, of course, remained the same. The absence of a vascular pedicle from the neck to the mediastinum therefore does not exclude the presence of a parathyroid gland in the chest. It is conceivable that one could have reached the tumor in this case from the neck incision by inserting the fingers down behind the sternum and catching it. In view of the size of the arterial blood supply, any attempt to deliver the tumor from the mediastinum into the neck would have been risky. Undoubtedly, the vascular pedicle would have torn, and there would have been an intrathoracic hemorrhage, which could not have been controlled from the neck. We have delivered three such tumors from the mediastinum into the neck, but we now know it to be risky, not only because of hemorrhage but also because of possible pneumothorax. Moreover, it is not possible to reach far enough down with the fingers inserted in the neck. One patient who came to autopsy had a parathyroid adenoma resting on the right auricle on the upper folds of the pericardium. This was at least 5 cm. below the reach of fingers inserted into the notch of the manubrium. Therefore, the operation of exploration for a parathyroid tumor is now divided into two stages. In the first stage, the neck and posterosuperior mediastinum are explored — that is, the region that can be exposed to direct vision. If the adenoma is not found in this exploration, it must be in the anterior mediastinum. At the second stage, the sternum is split so that the anterior mediastinum can be explored under direct vision.

DR. TRACY B. MALLORY: I have only to add that the tumor was a characteristic parathyroid adenoma on microscopic section — a large one, with many glandular and cystic spaces in it.

DR. JOSEPH C. AUB: Did you look for the fourth gland?

DR. COPE: We did not. The size of this adenoma was adequate to account for the severity of the disease that this patient had. If we had found a small adenoma, we certainly would have looked for the fourth gland to make sure that it did not contain a second adenoma. About 10 per cent of our patients with adenomas have had two adenomas. The weight of adenomatous tissue is roughly proportionate to the degree of elevation of the blood calcium. This patient's tumor was a large one. The chances were against her having a second adenoma. Actually, I did look throughout the thymus gland, which was the most likely place to find the fourth, but did not encounter it. The subsequent course of the patient has shown that there is presumably no further hyperactive tissue.

A PHYSICIAN: What percentage of glands are found in the mediastinum?

DR. COPE: Of the 67 cases of proved hyperparathyroidism at this hospital, 60 were due to adenoma and 7 to hyperplasia. Of the cases with adenoma, 13 adenomas were found in the anterior mediastinum, and 5 in the posterior mediastinum. This gives an exaggerated percentage, since cases sent to this hospital for secondary explorations have turned out in large proportion to have the adenoma within the mediastinum. I believe about 10 per cent would be the true figure.

The New England
Journal of Medicine

Formerly
The Boston Medical and Surgical Journal

Established in 1828

Owned by the Massachusetts Medical Society and Published under the Jurisdiction of the Committee on Publications

Official Organ of
The Massachusetts Medical Society
and
The New Hampshire Medical Society

Editorial Board

Joseph Garland, M.D.
William B. Breed, M.D.
George R. Minot, M.D.
Frank H. Lahey, M.D.
Shields Warren, M.D.
George L. Tobey, Jr., M.D.
C. Guy Lane, M.D.
William A. Rogers, M.D.
Stephen Rushmore, M.D.
Henry R. Viets, M.D.
Robert M. Green, M.D.
Charles C. Lund, M.D.
John F. Fulton, M.D.
A. Warren Stearns, M.D.
Dwight O'Hara, M.D.
Chester S. Keefer, M.D.

Associate Editors

Thomas H. Lanman, M.D.
Donald Munro, M.D.
Henry Jackson, Jr., M.D.

Walter P. Bowers, M.D., Editor Emeritus
Robert N. Nye, M.D., Managing Editor
Clara D. Davies, Assistant Editor

Subscription Terms: $6.00 per year in advance, postage paid, for the United States (medical students, $3.50 per year); Canada, $7.04 per year, Boston funds; $8.52 per year for all foreign countries belonging to the Postal Union.

Material for early publication should be received not later than noon on Friday.

The Journal does not hold itself responsible for statements made by any contributor.

Communications should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

WAR AND MASSACHUSETTS PHYSICIANS

This issue of the *Journal* contains a series of six papers presented at the annual meeting of the Massachusetts Medical Society that discuss the war effort as it relates to various aspects of medicine. The medical profession of any nation plays such a significant role in modern warfare — in combat areas, in training centers, in industry and in civilian communities — that each article should be carefully read by all physicians, particularly those who practice in Massachusetts, and even including those who listened to the papers at the annual meeting.

Dr. Frank H. Lahey forcefully emphasizes the need for young physicians in the armed forces, states that *all* physicians will eventually be utilized in one capacity or another if the war continues, and exhorts those who are classified as "available" to apply immediately for commissions.

Dr. Reginald Fitz discusses the problems and experience of the Massachusetts committee of the Procurement and Assignment Service. He, too, stresses the need for young physicians and presents an analysis of the status of the 3000 Massachusetts physicians under forty-two years of age. According to his figures, 1200 of these young physicians are necessary to the health and welfare of civilians, whereas the remaining 1800 comprise a pool in which the essentiality or availability of each individual must be determined.

Dr. Elliott C. Cutler outlines the organization and modus operandi of the Medical Division of the Massachusetts Committee on Public Safety, pays due tribute to the time and effort given by Massachusetts physicians to the establishment of local medical committees, to the training of mobile medical units, to the proper equipping of hospitals and to provisions for medical and civilian evacuation, and asks that this interest be continued.

Dr. A. William Reggio covers the physician's role in first aid, particularly emphasizing the need for all physicians to become thoroughly familiar with accepted first-aid procedures, so that they may be qualified to give first-aid courses, to instruct intelligently the members of first-aid parties and the helpers of the medical first-aid posts and to apply first-aid measures themselves, if necessary.

Dr. Bennett F. Avery presents the problems that have been raised by the accelerated schedule of education adopted by nearly 90 per cent of the medical schools in this country and by the need for more detailed instruction in matters pertaining to military medicine.

Finally, Dr. Charles F. Wilinsky gives certain objectives that may be considered the minimum goal of all hospitals during the emergency. These include the protection of physical property, the care of casualties and facilities for evacuation.

All these matters are of vital interest to Mas-

sachusetts physicians, and by the publication of these six papers in a single issue of the *Journal* it is hoped that a means will be furnished whereby each physician will become thoroughly familiar with his responsibilities during the present crisis.

THE SINISTER SHEPHERD

Professor Samuel E. Morison* in his *Admiral of The Ocean Sea* has analyzed the available data and opinions regarding the possible transmission of syphilis from the New to the Old World as the result of the discovery of America by Columbus. One chapter, entitled "The Sinister Shepherd," is an excellent summary of all that is known of importance about this controversial subject. He should receive wide recognition from physicians for his handling of the perplexing problem, since he, a nonmedical historian, has done a better job than any medical writer on the topic.

As Professor Morison points out, the evidence appears to be sound that syphilis existed in America before the first voyage of Columbus in 1492. It was present, in all probability, among the Indians of the islands and continent. He reached this conclusion only after careful deliberation, and in spite of the fact that some historians and archeologists do not agree.

The question whether syphilis existed in Europe before Columbus returned in 1493 is a much more difficult one to answer. Everyone knows that, in 1495 or 1496, syphilis became rampant in Europe. Before 1495, however, there is no clear clinical description of a case that one can say with certainty was syphilitic. On the other hand, Sudhoff collected a great amount of evidence to prove that syphilis existed in France, Germany and Italy long before 1493. According to this eminent historian, the march of the French army on Naples in 1495 simply stirred up and spread the organism, which was already in existence. Other historians believe that Sudhoff is wrong about this matter, for he based his arguments on uncertain data and a few clinical descriptions that may point to another disease. It seems certain, moreover, that syphilis, in the form and to the extent in which it ravaged Europe in 1495 and after, could not have been evident before that date. If syphilis had been present before that time, it must have been in a dormant form and something must have served as an activator. Was this activator the syphilis brought over by the sailors with Columbus?

Professor Morison does not believe that the sailors were actually responsible for bringing over the syphilis, but he does think that the Indian captives whom Columbus brought back on his first voyage were probably carrying the *Treponema pallidum*. None of the crew were ill, even when they reached Spain. If they had acquired syphilis before leaving the New World, they would surely have shown evidence of the disease at that time, particularly in view of the virulent type of syphilis that subsequently developed. The Indian captives, on the other hand, might have carried the disease without manifesting marked signs while on the voyage, only to transmit it to European soil where, because no one was protected against this type of syphilis, a virulent outbreak occurred. This is the basis of Professor Morison's argument, and he has presented so strong a case that it will be accepted by many. This hypothesis, moreover, is supported by three reputable writers of the middle sixteenth century — Las Casas, Oviedo and Diaz de Isla, the last a house physician in a Lisbon hospital. It seems, therefore, that America was the original home of the "sinister shepherd."

*Morison, S. E. *Admiral of the Ocean Sea: A life of Christopher Columbus*. 2 vol. 893 pp. Boston: Little Brown and Company, 1942.

MEDICAL EPONYM

Plaut-Vincent's Angina

Hugo Carl Plaut (1858-1928) of Leipzig published his "Studien zur bacteriellen Diagnostik der Diphtherie und der Anginen [Studies in the Bacterial Diagnosis of Diphtheria and the Anginas]" in the *Deutsche medicinische Wochenschrift* (**20**:920-923, 1894). A portion of the translation follows:

> Five successive cases of simple angina deserve mention because of the type of micro-organism that, there seems to be no doubt, was their cause. . . . Inspec-

tion of the oral cavity, which contained many carious teeth, showed a dirty exudate on both medial surfaces of the markedly swollen tonsils and the left side of the uvula. . . . Microscopic examination of the exudate showed it to consist bacteriologically of nothing but Miller's spirochetes and Miller's bacilli. . . . Miller's bacilli are . . . much larger than the diphtheria bacilli, are, in contradistinction to these, pointed at the ends, and are always associated with the spirochetes, which apparently have some genetic relation with them. . . . These micro-organisms of Miller's are found in small numbers in almost every normal mouth, but usually only under the gum margins. [The organisms referred to were described by W. D. Miller, an American physician and dentist in Berlin, in 1883.]

H. Vincent (1862), military surgeon and bacteriologist, wrote "Sur une forme particulière d'angine diphtéroïde (angine à bacilles fusiformes) [On a Peculiar Form of Diphtheroid Angina (Angina with Fusiform Bacilli)]" in the *Bulletins et mémoires de la société médicale des hôpitaux de Paris* (**15**, 3rd series: 244-250, 1898). A portion of the translation follows:

This angina is characterized by a grayish or whitish pseudo-membranous exudate, by the associated fever and occasionally rather marked adenitis. . . .

If a bit of the pulpy exudate that appears on the surface of the pharynx is removed and stained with thionin or Ziehl's dilute fuchsin, microscopic examination shows two kinds of microbes to be predominant: a peculiar bacillus, easily recognizable by its length (about 10 to 12 microns) and its bulging central portion and distinctly tapering ends, and a delicate spirillum, more difficult to stain. This spirillum is quite similar to that normally present in the saliva and dental tartar.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

COMMITTEE ON MATERNAL WELFARE

CASE HISTORY: FATAL PRENATAL SEPARATION OF THE PLACENTA

A thirty-seven-year-old gravida VI began to bleed when she was eight months pregnant, and was seen by her physician. The bleeding was painless; she was not in labor. No steps were taken until additional bleeding occurred, and she was sent to a hospital. In this institution, nothing whatsoever was done for her, and she was finally sent to another hospital, where she arrived nine and a half hours after the initial bleeding. On admission, the hemorrhage was brisk, the blood pressure was 72 systolic, 60 diastolic, and no fetal heart could be heard. A diagnosis of separated placenta was made. Vaginal examination revealed the cervix to be dilated sufficiently to admit one finger. The vagina and cervix were packed with gauze, and a Spanish windlass was applied. Intravenous glucose was administered, but the patient was given no blood transfusion because no donor could be obtained. She died undelivered eight hours after entry to the second institution.

Comment. There is no information concerning the past history of this patient, and whether or not she had any prenatal care is unknown. Since there is no record of the blood pressure when she was first seen at home at the onset of bleeding and no statement of any urinalysis, it is not known whether the separation was associated with hypertension and albuminuria. The treatment accorded the patient by the physician who first saw her and by the hospital to which she was first sent is disgraceful: no examination was made, and she was not hospitalized until a second hemorrhage occurred. Her stay in the first hospital was merely a loss of time. Apparently, this institution was equipped neither professionally nor mechanically to deal with obstetric emergencies; the patient was untreated for at least two hours, and was then transferred to the second hospital. The treatment from then on cannot in any way be criticized, except for the fact that no transfusion was given. Patients with separated placenta who have a blood pressure of 72 systolic, 60 diastolic, and who have been bleeding for nine hours and continue to do so are very poor risks for laparotomy. The conservative treatment of packing the cervix and vagina and applying a Spanish windlass would in all probability have been successful had it been administered when the patient entered the first hospital.

The presence of plasma in most institutions helps materially in reducing the fatalities from hemorrhage when it is impossible to secure a blood donor.

DEATHS

LA MARCHE — WALTER J. LA MARCHE, M.D., of Cambridge, died May 30. He was in his eighty-first year.

Born in Belmont, Dr. La Marche received his degree from Laval University Medical Faculty, Montreal, and did postgraduate study in France. He was a former member of the Orthopedic Department, Massachusetts General Hospital, and of the staff of the Holy Ghost Hospital for Incurables, Cambridge. He had practiced in Massachusetts for over fifty years, and was a retired member of the Massachusetts Medical Society and the American Medical Association.

His widow, three sons and a granddaughter survive him.

SHULTIS — FREDERICK C. SHULTIS, M.D., of Leominster, died June 23. He was in his seventieth year.

Dr. Shultis received his degree from Dartmouth Medical School in 1897. He served on the staff of the Leominster Hospital. He was a fellow of the Massachusetts Medical Society and the American Medical Association.

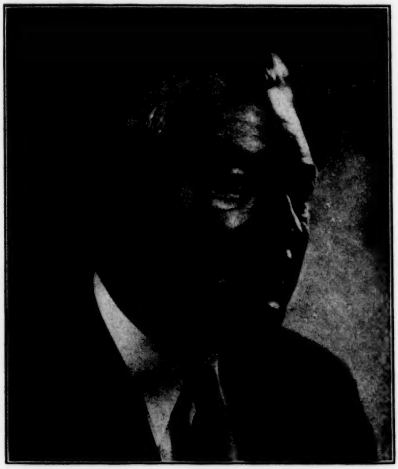
Two cousins survive him.

MASSACHUSETTS MEDICAL SERVICE

McCann Named President by Board

Dr. James C. McCann, of Worcester, was elected president of the Massachusetts Medical Service at the first meeting of the Board of Directors held at the Harvard Club in Boston on June 23. Serving as vice-president is Philip M. Morgan, president of the Morgan Construction Company, of Worcester. Edmund L. Twomey, attorney, of Newton, was elected treasurer. The Board meeting was the first step in a comprehensive program that will attempt to make the state-wide system for the budgeting of medical care available to the public shortly after September 1.

Dr. James C. McCann, *President*



Mr. Philip M. Morgan, *Vice-President*

Dr. McCann has practiced surgery in Worcester since 1929. A native of Bangor, Maine, he graduated *magna cum laude* from Georgetown University in 1920, and from the Harvard Medical School in 1924. He received his Ph.D. in surgery at the Mayo Clinic of the University of Minnesota in 1929, and held a lieutenancy in the Army in 1918–1919. He is married and the father of six children.

Mr. Morgan, vice-president of the Massachusetts Medical Service, is a veteran of the first world war, a director of the Mechanics National Bank, of Worcester, and of the State Mutual Life Assurance Company, a trustee of Springfield College and Governor Dummer Academy, a director of the Massachusetts Safety Council and a member of the Executive Committee of the National Safety Council.

Mr. Twomey, treasurer, is a graduate of Holy Cross College and, in 1926, of Harvard Law School. He has practiced for many years with the Boston law firm of Palmer, Dodge, Barstow, Wilkins and Davis. He is married, has one son, and lives in Auburndale.

Pointing out that the medical profession is undertaking a radical departure from its previous mode of practice, Dr. McCann stated that the physicians are ready to accept their obligation in trying to solve the high cost of medical care according to the American principles of democracy, at the same time maintaining the principle of private initiative and free practice.

"The launching of the Massachusetts Medical Service should lead to a very definite betterment of civilian morale," Dr. McCann said, "first, by the maintenance of health in industrial groups, and secondly, by assuring the families of the men in the armed forces that their medical-care burdens will be lightened."

Simultaneously, Dr. McCann announced that the Massachusetts Medical Society has established capital funds necessary to start the corporation in business and that Boston headquarters have been opened at 230 Congress Street. The corporation charter was granted by the State Commissioner of Insurance on May 27.

Summer Program

The first step in the summer program, according to Dr. McCann, is enrollment of the participating physicians. An attempt will be made for 100 per cent enrollment among the physicians remaining in civilian practice, and it is hoped that those going into the service will pledge their support.

The plan, as reported in the June 18 issue of the *Journal*, will provide budgeted payment of the full medical cost of hospital surgery, obstetrics and x-ray service for families with incomes not exceeding $2500 yearly and for families with larger incomes on a cash indemnity basis. Later, it is proposed to extend the coverage and the benefits.

Physicians to Serve on Board

Members of the medical profession are represented equally with laymen and subscriber representatives on the Board of Directors of the Massachusetts Medical Service.

In addition to Dr. McCann, who is serving as president, the physicians are Dr. J. Harper Blaisdell, Dr. Frank R. Ober and Dr. Samuel A. Robins, of Boston, and Dr. Charles E. Mongan, of Somerville. They have been appointed to the Central Professional Committee of the new nonprofit corporation.

Born in Providence, Dr. Blaisdell graduated from Dartmouth College in 1907 and from Harvard Medical School in 1911, and has practiced in Boston since 1914 as a dermatologist. Assistant dermatologist at the Massachusetts General Hospital for twelve years, he is now consulting dermatologist for the Winchester, Melrose, Malden, Haverhill and Exeter, New Hampshire, hospitals. He is a director of the Blue Cross and a member of the Council and the Committee on Public Relations of the Massachusetts Medical Society.

Retiring president of the Massachusetts Medical Society, Dr. Ober was born at Mt. Desert, Maine, and graduated from Tufts College Medical School in 1905. He came to Boston in 1914 as house surgeon at the Children's Hospital. Since 1937, he has been John B. and Buckminster Brown Clinical Professor of Orthopaedic Surgery at the Harvard Medical School; he is also assistant dean of graduate courses at the Harvard Medical School and professor of orthopedic surgery at the University of Vermont College of Medicine. He is surgeon-in-chief of the New England Peabody Home for Crippled Children and orthopedic surgeon at Peter Bent Brigham Hospital. He was a major in the Medical Corps, United States Army, in World War I and has been the editor or author of a number of medical volumes and papers.

Dr. Robins graduated from the Tufts College Medical School in 1914 and did postgraduate work at the Tewksbury State Hospital and Boston City Hospital. Past president of the Greater Boston Medical Society, he is chief of the x-ray laboratories at the Beth Israel Hospital and was, for fifteen years, visiting roentgenologist of the Evangeline Booth and Boston Lying-in hospitals. He is a consulting roentgenologist to the Norwood Hospital and the Pratt Diagnostic Clinic. Clinical professor of radiology at Tufts College Medical School and instructor in radiology at Harvard Medical School, he is the author of numerous articles.

A member of the House of Delegates of the American Medical Association since 1921, Dr. Mongan received degrees of A.B. and A.M. from Boston College, and graduated from the Harvard Medical School in 1892. He did postgraduate work at the Rotunda Hospital, Dublin, and studied at Guys Hospital and the Brampton Hospital in London. Returning to Somerville as a general practitioner, Dr. Mongan has been a member of the senior staff of the Somerville Hospital since 1895 and is also a member of the staff of the Holy Ghost Hospital in Cambridge. He was the first president of the New England Obstetrical and Gynaecological Society and is a former president of the Massachusetts Medical Society. Recently, he was appointed by the Mayor of Somerville as chairman of the advisory committee studying matters concerning public welfare.

WAR ACTIVITIES

CIVILIAN DEFENSE

Decontamination Services

The following letter has recently been released by the Office of Civilian Defense, Washington, D. C.:

> The Office of Civilian Defense publications, *Protection Against Gas, First Aid in the Prevention and Treatment of Chemical Casualties* and *Handbook for Decontamination Squads*, outline the technics of decontamination. This letter sets forth the recommendations of the Office of Civilian Defense for the organization and administration of decontamination services.
>
> #### Decontamination of Persons
>
> The decontamination of persons is the responsibility of the Emergency Medical Service. In cities within the target areas, facilities for decontamination of the wounded should be provided at or convenient to every hospital and casualty station. Facilities for the wounded should be separate from those for ambulant persons, because in a single station there will be a tendency to give priority treatment to the wounded while the ambulant become more severely burned.
>
> It is not practicable for a city to provide complete decontamination services at the present time. Persons contaminated with liquid vesicants must be treated within five minutes to avoid severe burns; complete preparation would therefore require that facilities

be sufficiently numerous so that every individual is within five minutes' walk of a decontamination station. Military authorities consider the use of gas against American cities unlikely, and the scarcity of materials precludes the possibility of extensive construction of decontamination facilities. It is desirable, however, that key personnel be trained and that plans be prepared so that facilities can be improvised and placed in operation on short notice, if necessary.

Decontamination stations should be of simple construction, with ample facilities for disrobing, bathing and chemical neutralization of agents that may have reached the skin. Wood is to be avoided in construction, because it absorbs mustard gas and lewisite and is difficult to decontaminate. Brick, concrete or metal structures are preferable. All porous materials, including brick and concrete, should be painted with sodium silicate paint. Gasoline filling stations are widely distributed in most communities and offer many advantages in view of their isolation, washing facilities, and comparatively impervious construction. The Office of Civilian Defense will shortly issue plans indicating how filling stations may be adapted for this purpose.

The chief of Emergency Medical Service is responsible for organizing and training medical and other personnel to operate decontamination stations. Physicians and nurses must know how to protect themselves while handling contaminated cases, the effects of the various agents on the eyes, skin and respiratory tract, and measures for decontamination of the skin and eyes at various stages after exposure. Stations for ambulant personnel do not necessarily need a physician in attendance, but the person in charge should understand the dangers and limitations of chemical decontamination. He should also be on the alert for victims with respiratory tract, eye or severe skin exposure, who should be transferred to a hospital as soon as decontaminated. All members of emergency medical field units should be trained and drilled in decontamination.

The chief of Emergency Medical Service may appropriately request the local health department to establish and staff facilities for decontamination of uninjured persons. Public-health nurses have experience in independent action and in handling groups of people, which fits them to supervise decontamination stations. Decontamination services organized and staffed by the health department for the decontamination of persons will operate as a branch of the Emergency Medical Service, under the commander of the Citizens' Defense Corps.

DECONTAMINATION OF STREETS, BUILDINGS AND VEHICLES AND OF FOOD AND WATER SUPPLIES

The Office of Civilian Defense charts for the Citizens Defense Corps and the staff manual provide for decontamination squads as a part of the Emergency Public Works Service. The chief of Emergency Public Works Service has the responsibility for organization, training and administration of these squads. In their functioning, their first task is rough decontamination of areas and of things in those areas. They will, in carrying out this function, use equipment, especially street-flushing machines, that presumably will be found in the public-works department of the usual municipality. Their first responsibility is the decontamination of streets, public buildings and the approaches thereto. The inspection and testing for gas contamination and the decontamination of food and public water supplies are responsibilities of the municipal health department.

APPOINTMENT OF GAS OFFICERS

It is suggested that the commander of the Citizens' Defense Corps, appoint, as a member of his staff, a senior gas officer, who will normally be chosen from the city health department. His functions will be to supply technical direction and assistance with respect to action to be taken before, during and after gas attacks. The duties of the senior gas officer are as follows:

During the period of preparation:

1. He should become trained and familiar with the chemistry of war gases and the technics and chemistry of decontamination. This information can be acquired from the Office of Civilian Defense publications and by attendance at the War Department civilian-protection schools and at special schools being established by the Medical Division, Office of Civilian Defense, in co-operation with the United States Public Health Service and the War Department schools.

2. He should recommend for appointment assistant gas officers with qualifications similar to his own, and train them to serve as his technical assistants to supervise decontamination of food and water.

3. He should, with the chief of Emergency Medical Service, select the sites for decontamination stations and provide consulting and technical service in the design and construction of these facilities.

4. He should instruct laundries in the technics of handling various types of contaminated clothing and arrange for the safe transfer of contaminated clothing from decontamination stations to laundries and for the return of clean clothing. For this purpose, he may appoint a laundry officer from the trade in the city.

During the period of operation:

1. Identification of chemical agent or agents used in an area.

2. Determination of the extent of the area contaminated, and advice to wardens and police in the vicinity concerning the type of agent or agents and the extent of contamination.

3. Inspection and technical advice concerning the decontamination of streets and buildings, and reports to the police and wardens when an area is safe for movement.

4. Inspection of food and water supplies, and supervision of proper measures for their decontamination. (In dealing with food and water supplies, he should train and utilize the personnel of the municipal health department regularly employed for the supervision of food and water supplies.)

5. Collection and safe transportation to laundries of contaminated clothing and return of clean clothing to decontamination stations or hospitals (through laundry officer).

6. Inspection and technical control of decontamination of vehicles, equipment and machinery, including ambulances and other vehicles used in the transportation of casualties.

REPORT OF MEETING

NEW ENGLAND PATHOLOGICAL SOCIETY

A regular meeting of the New England Pathological Society was held on February 19 at the Massachusetts General Hospital.

Before and after the formal portion of the meeting an exhibit of pulmonary surgical specimens was demonstrated by Drs. Klopstock, Churchill and Castleman. The exhibit consisted of large watch-glass preparations, together with photographs and x-ray films of cases of bronchiectasis, lung abscess, cancer, bronchial adenoma, tuberculoma and tuberculous bronchial stenosis.

The first paper, "Subdural Abscess: A clinicopathologic study," was presented by Drs. Charles S. Kubik and Raymond D. Adams. The clinical features and pathological and surgical observations in 14 cases of subdural abscess were described. The sources of infection were paranasal sinusitis in 12 cases, otitis media in 1 case, and bronchiectasis with metastatic infection in 1 case. The symptoms in the cases in which abscess complicated sinusitis conformed to a fairly definite pattern: acute sinus infection, usually an exacerbation of chronic sinusitis; orbital swelling; pain or headache, at first localized, later becoming generalized and increasing in severity; rise in temperature, as a rule to 103°F. or higher; leukocytosis; stiffness of the neck; drowsiness, rapidly increasing to stupor and coma; and focal signs, which appeared at about the same time as drowsiness or stupor. Hemiparesis or hemiplegia occurred in every case. Paralysis of contralateral deviation of the eyes nearly always developed, and aphasia was observed in most cases of left-sided abscess. Jacksonian seizures were fairly common.

Spinal-fluid pressure, which was nearly always increased, ranged from normal to the equivalent of 350 mm. of water. Cell counts generally ranged from 150 to 600 per cubic millimeter, with polymorphonuclear leukocytes predominating, although in 1 case the count was 15 (lymphocytes) and in another 1200 (95 per cent polymorphonuclear leukocytes). The sugar content of the spinal fluid was normal. Chlorides were slightly decreased in 2 cases and normal in 2. The total protein ranged from 49 to 186 mg. per 100 cc. No organisms were found in smears or cultures.

Except for absence of sinus infection and orbital swelling, the clinical manifestations in the 2 other cases, secondary to otitis and bronchiectasis, respectively, were similar to those complicating sinusitis.

The course was rapidly progressive. In 12 cases, death occurred six to twenty days after onset of headache, and two to eight days after focal signs were first observed. In 2 cases, recovery took place after drainage of the abscess following a frontoparietal craniotomy.

In a majority of the 12 cases in which autopsy was performed, extension to the subdural space took place by direct extension through the dura; in the remainder, there was thrombophlebitis involving the venous sinuses, usually the superior longitudinal. The subdural pus in all cases covered the greater part of the lateral surfaces of the hemispheres, the greatest amount being situated over the lateral aspects of the frontal lobes. It was not encapsulated, although in some of the cases of old abscess, there was organization of the exudate on the inner surface of the dura. There was regularly a localized subarachnoid exudate, conforming in its distribution to that of the subdural exudate, but scarcely any generalized meningitis. The frontal lobes beneath the abscesses were depressed, somewhat as with subdural hematoma, and in the underlying cortical gray matter there were severe ischemic necrosis and, in most cases, thrombosis or thrombophlebitis involving the subarachnoid veins.

It was pointed out that the clinical picture in each case was similar and that the diagnosis can therefore be made in time to save some of the patients. Drainage, it was thought, should be through a lateral frontal craniotomy opening, and not through the frontal sinus or a mastoidectomy wound. Performed in this way, the operation is simple and quick, and if the results are negative, little or no harm is done, provided that the brain is not explored. Once an empyema has developed, nothing is to be gained, and much may be lost, by operation on the sinuses or the mastoid. These may be taken care of later, if necessary, as was done in the 2 cases in which recovery took place.

The second paper, "Isolation of Pleuropneumonialike Organisms from Human Patients," was presented by Drs. William E. Smith and Louis Dienes. In a consecutive series of cultures from the genital tract of 129 unselected patients, pleuropneumonialike organisms were recovered from 23 of 77 cervical cultures, from 1 of 8 vaginal cultures, from 3 of 36 prostatic cultures and from 1 of 8 cultures of urethral discharges from men. It is apparent that these organisms are common inhabitants of the human genital tract. The question then arose whether they are saprophytes or pathogens.

The four male patients who yielded an abundant growth of these organisms all had chronic prostatitis. One had rheumatoid arthritis, 1 had polyarthritis clinically resembling gonococcal arthritis, and 1 complained of soreness of the feet and knees and swelling of the fingers. Specimens of synovial fluid were obtained from 2 of these patients, but no organisms could be demonstrated in them. Pleuropneumonialike organisms were recovered in only 1 other case, that of a man who also had chronic prostatitis.

Among the women, considering only those in whom pleuropneumonialike organisms were predominant, 5 had chronic cervicitis, 7 had gonorrhea, and in 4, the cervix appeared clean. One had a polyarthritis clinically resembling gonococcal arthritis, 1 had rheumatoid arthritis, and 3 complained of various skeletal aches and pains. Synovial fluid was obtained from the first-mentioned patient but was sterile. One of these patients was the wife of one of the male patients, a finding that suggests the possibility of transfer of the organisms by sexual intercourse.

In addition to the patients in this series, pleuropneumonialike organisms were obtained from any cervical cultures and specimens from purulent complications. Several of these cases presented the clinical picture of acute gonococcal cervicitis. Cultures and smears were repeatedly negative for gonococci, but pleuropneumonialike organisms were present in large numbers and in almost pure culture. One patient, an eighteen-year-old girl, developed an acute vaginitis with purulent discharge four days after intercourse. An abundant growth of pleuropneumonialike organisms was recovered from this discharge. In another case, these organisms were recovered in pure culture from an abscess of Bartholin's gland. In a case of salpingitis, pleuropneumonialike organisms and a few colonies of diphtheroids were cultivated from the pus expressed from the tubes. In a case of peritonitis secondary to salpingitis, an anaerobic bacillus (genus, Bacteroides) was obtained in pure culture from the peritoneal pus, and pleuropneumonialike organisms were subsequently separated from the

cultures of this bacillus as a variant growth form. This patient made an uneventful and prompt recovery from her peritonitis; pleuropneumonialike organisms were recovered from the cervix, indicating that the cervix had been the portal of entry of the infection. Gonococci could not be demonstrated in any of these cases.

The picture that is beginning to emerge from the evidence at hand is that pleuropneumonialike organisms, like many other bacteria, may live in the genital tract without causing any obvious disease; however, they are capable of acting as pathogenic agents either alone or in combination with other bacteria. When they cause disease, they produce a clinical picture that is similar to gonococcal infection, in that a purulent discharge develops and such complications as abscess of Bartholin's gland, salpingitis and peritonitis may ensue. In men, these organisms have been found only in cases of chronic prostatitis. One must bear in mind the possibility that these strains may represent variant forms of bacteria, as suggested by Dr. Dienes in the subsequent paper.

The incidence of arthritis in this series is of particular interest because arthritis is a common complication of both the natural and the experimental diseases produced in animals by organisms of this group. Dr. Smith has not been able, however, to recover pleuropneumonialike organisms from diseased joints, although a considerable number of specimens of joint fluids, synovial tissues and subcutaneous nodules from arthritic patients were examined.

The third paper, "The Nature of Pleuropneumonialike Organisms," was presented by Dr. Dienes. According to the generally accepted opinion, the etiologic agent of bovine pleuropneumonia and morphologically related organisms belong to a distinct class. The organisms of this group have characteristic physical properties, morphology and mode of reproduction. They are soft and have no rigid membranes. They show an extreme pleomorphism, growing from small filter-passing granules and fine filaments into large soft bodies 20 microns or more in diameter. These large bodies take part in multiplication either by germination or by breaking down into small granules. These properties make it appear that there is no similarity in any essential characteristic between the pleuropneumonialike group of organisms and ordinary bacteria.

It was therefore very surprising when an organism of the pleuropneumonia group was found in a bacterial culture (*Streptobacillus moniliformis*). This association is so close that the bacteria cannot be freed from the pleuropneumonialike organism. The study of this association brought forward the following facts: the organism is not present in the bacterial cultures as a contaminant or symbiont but develops by the transformation of the bacteria; the two forms are serologically similar, reacting equally well with the agglutinating serum produced against either; and for a certain period after isolation, the pleuropneumonialike forms easily revert into the bacterial forms. These facts make it certain that the connection between the two forms is not a bacterial association but that they are variant forms of the same organism.

Dr. Dienes has observed similar variants in cultures of *Bacterium funduliformis*, a flavobacterium, *Haemophilus influenzae*, *Escherichia coli* and the gonococcus. He was able to separate the pleuropneumonialike variants of *Bact. funduliformis* and the flavobacterium and to propagate them in pure culture.

On the basis of these observations, Dr. Dienes believes that the organisms of the pleuropneumonia group do not constitute a class unrelated to the bacteria, but that they represent a variant growth form of bacteria. With *S. moniliformis*, this variation has been shown to be reversible. The colonies of the streptobacilli can be seen to produce the pleuropneumonialike variant, which then breeds true on repeated subculture on agar plates, but reproduces streptobacilli when placed in broth. In other cases in which pleuropneumonialike forms were produced by organisms such as *Bact. funduliformis* and the flavobacterium, the pleuropneumonialike forms have not been observed to revert into bacterial forms, but it should be added that these strains were only recently isolated and have not been intensively studied.

The observation of pleuropneumonialike variants in cultures of several different bacteria and, in particular, of reversible variation in well-studied cultures of *S. moniliformis* makes it reasonable to hypothesize that pleuropneumonialike strains that show no relation to bacteria represent so-called "fixed species," which developed as nonreversing variant forms from ordinary bacterial organisms. For example, the organisms of bovine pleuropneumonia, agalactia and human strains appear to be such fixed species.

The discovery of this new type of bacterial variation may have considerable significance. The pleuropneumonialike organisms are filterable, they are similar in staining properties to the viruses, and the diseases that they cause have usually been mistaken for virus diseases. Their further study may explain some of the unsolved problems of infectious diseases.

In the discussion of these two papers, Dr. Tracy B. Mallory emphasized the point that Dr. Dienes had opened up a field of great potential value but that it is too early to see how great its practical importance is, although it may prove to be considerable. Some of these cases, which Dr. Smith had spoken of as vaginitis or cervicitis, were cases that clinically were believed to be characteristic of gonococcal infection. Dr. Mallory said that he had seen two or three cases reported to the State Department of Public Health as gonorrhea, but the most careful check, both by symptoms and repeated cultures, always failed to reveal the gonococcus. It seems quite probable that these were false reports, and that the cases represented infection with one of the pleuropneumonialike organisms.

In answer to the question how the name "pleuropneumonia" was arrived at, Dr. Dienes explained that the first organism of this group to be discovered was the etiologic agent of bovine pleuropneumonia, a very serious disease of cattle in Europe. Since then, other organisms of similar morphology have been found and have been called pleuropneumonialike organisms.

The last paper, "Renal Biopsies from Hypertensive Patients," was presented by Dr. Benjamin Castleman. During the past year he has had the unique opportunity of studying the renal tissues removed at biopsy from 70 patients during the course of splanchnic sympathectomies for the relief of hypertension. More than half the patients were under forty years of age, and the average age of the group was thirty-nine years. About two thirds of the group had normal renal function as measured by the phenolsulfonphthalein test. All but 3 cases showed definite vascular disease, the severity of which was classified into four groups, Grade I being the least involved and Grade IV the most. The arterial and arteriolar lesions were of old types: intimal hyalinization, medial hypertrophy and endothelial hyperplasia. Any individual case might show lesions of only one type or of combinations of them. An attempt was made to correlate the grade of vascular disease with the renal function and with the appearance of the eyegrounds. Although in most cases the degree of

renal disease compared favorably with the degree of renal function, in a few cases there were some inconsistencies. There was not, however, so good a correlation between the renal and the retinal vascular disease. For example, a few of the normal and Grade I renal disease cases had Grade III or IV eyeground changes. Although all but 3 cases showed renal vascular disease, it was not suggested that the vascular disease must necessarily precede the hypertension, because a large proportion of patients from whom biopsies are not available but who had the same radical operation (bilateral total splanchnic resection from the semilunar ganglion to approximately the midthoracic level and resection of the sympathetic trunk from the ninth dorsal to the first or second lumbar segment, inclusive) now have normal or almost normal blood pressure. In other words, many of these patients were benefited despite their renal disease. Dr. Castleman concluded that it was quite possible that the renal disease might be secondary to the hypertension and that, if the renal changes are only slight, sympathectomy might allow for a reversible reaction. If the renal vascular disease is severe, the anatomic changes are probably irreversible, but even in these cases clinical improvement may be very striking. One case was cited in which a second biopsy specimen, removed one year after the first from a twenty-seven-year-old woman, showed that, although the blood pressure, which was 235 systolic, 145 diastolic, before splanchnic resection, was then normal, the renal disease (Grade III) had not changed.

The discussion centered about the earliest changes noted in these cases, and Dr. Castleman stated that, although it has not been definitely proved, he believes that intimal hyalinization of the arterioles, rather than medial hypertrophy, may be the first anatomic evidence of hypertension.

BOOK REVIEWS

Roentgen Interpretation. By George W. Holmes, M.D., and Howard E. Ruggles, M.D. Sixth edition, thoroughly revised. 8°, cloth, 364 pp., with 246 illustrations. Philadelphia: Lea and Febiger, 1941. $5.00.

When a textbook on a specialized subject requires six editions in twenty-two years it usually means either that there is a great demand for the book or that the subject matter is changing rapidly. Probably both facts are true of this work. The newest edition is largely the work of the senior author, Dr. Holmes, since Dr. Ruggles died in 1939, while the revision was being made.

This edition is again a concise, accurate statement of the important facts in diagnostic roentgenology, and has been brought up to date with many additions to text and illustrations. There are no unconfirmed or unreliable statements with which one can take issue, and only the time-tested and proved methods and principles are described and illustrated. Its short concise and conservative descriptions are models of accuracy and brevity and are in themselves an index of work based on analytic reasoning.

This is an excellent up-to-date presentation in textbook form of the principles and most of the details of roentgenologic interpretation. It does not pretend to be a complete or exhaustive treatise on all phases of the subject or an encyclopedia of roentgenologic diagnosis, and yet it is surprising how well the subject is covered in so little space. If anyone could learn and retain all the information between its covers, he would indeed be well equipped to begin the practice of this specialty — lacking perhaps only the judgment born of long experience, some of which the author imparts to his reader.

There are but a few minor criticisms, which if heeded might make a good textbook even better: all the illustrations, unfortunately, are "positives," that is, the reverse in black and white of the original x-ray films — this is quite confusing to many students who are unable mentally to transpose the shadows to their original values; the index, which is after all one of the major parts of a textbook, — the can opener, one might say, — is rather scanty and in places incomplete; more of the illustrations could be clarified by a short description pointing out the salient features of the case or illustrations selected; and even greater benefit would accrue to the reader if the simple clinical facts or symptoms or the underlying pathologic process, could be tied in more frequently with the roentgenologic findings.

The typographic errors are but few and not serious. The references at the end of each chapter are largely to important source articles that give the details to those seeking further information. The printing, binding and mechanical details are excellently carried out, and the whole book is again the most valuable brief textbook of roentgenologic interpretation in the English language.

The Essentials of Occupational Diseases. By Jewett V. Reed, M.D., and A. K. Harcourt, M.D. 8°, cloth, 225 pp., with 1 chart. Springfield, Illinois: Charles C Thomas, 1941. $4.50.

In this day of wartime industry, all physicians should know the hazards to which the worker is exposed, especially because substitution is bound to be prevalent for necessary materials formerly obtained from foreign sources. This small volume is an excellent compendium of such information.

The symptoms, diagnosis and treatment of occupational disease are considered. The first half of the book is devoted to chemical poisons; then, physical agents are described. Various industrial dermatoses, including cancer, are discussed. Occupational diseases of the lungs and infectious diseases are briefly summarized. A very abbreviated chapter on functional disturbances associated with occupational diseases affords an interesting ending for the book. Prevention, which the reviewer considers the most important phase in any study of occupation, is unfortunately omitted.

This handy reference book should be in the library of all physicians.

Theory of Occupational Therapy: For students and nurses. By Nora A. Haworth, M.A. (Cantab.), M.R.C.S., L.R.C.P., D.P.M., and E. Mary MacDonald. With a foreword by Sir Robert Stanton Woods, M.D., F.R.C.P. 8°, cloth, 132 pp., with 81 illustrations. Baltimore: Williams and Wilkins Company, 1941. $2.00.

This practical manual, fully illustrated, gives a detailed account of the technic of occupational therapy as practiced in mental and other hospitals in Great Britain. Although the theory is stressed, much space is also given to the apparatus, finance, storage and similar problems. Written by authors of long experience, well known in America, this book is a welcome addition to the subject. The illustrations are particularly good.